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THE

BOOK OF BUTTERFLIES,

SPHINGES, AND MOTHS.

EDINBURGH:
PRINTED BY M. AITKEN, 1, ST JAMES'S SQ.

THE

BOOK OF BUTTERFLIES,

SPHINXES & MOTHS.



PRINTED FOR OLIVER & BOYD EDINBURGH
AND HURST CHANCE & Co LONDON.
1832.



THE

BOOK OF BUTTERFLIES,

SPHINGES, AND MOTHS;

ILLUSTRATED BY

ONE HUNDRED AND FORTY-FOUR ENGRAVINGS,

COLOURED AFTER NATURE.

BY

CAPTAIN THOMAS BROWN,

FELLOW OF THE LINNÆAN SOCIETY, MEMBER OF THE WERNERIAN, KIRWANIAN, AND PHRENOLOGICAL SOCIETIES, AND PRESIDENT OF THE ROYAL PHYSICAL SOCIETY.

Second Edition.

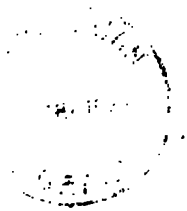
IN THREE VOLUMES.

VOL. I.

LONDON:

WHITTAKER & CO.; AND WAUGH & INNES, EDINBURGH.

1834.



TO THE HONOURABLE

MRS COLONEL OGILVY OF CLOVA,

THE FOLLOWING PAGES

ARE DEDICATED AS A MARK OF RESPECT,

BY HER

OBEDIENT HUMBLE SERVANT,

THOS. BROWN.

EDINBURGH, *July* 1832.

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PREFACE

TO THE

SECOND EDITION.

THE very rapid sale of an extensive First Edition of the "Book of Butterflies, Sphinges, and Moths," together with the favourable character which the British Press has bestowed on the Work, have induced the Proprietors to add an additional Volume, so as to render the book more perfect, by giving a variety of new and striking objects.

The Author has given, in the Third Volume, the modern arrangement of the *Papilionacea*, showing the new genera which have been formed from the Linnæan genera Papilio, Sphinx, and Phalæna. He has besides added *directions for* collecting, breeding, preserving

and setting this interesting tribe of insects; with a description of the instruments made use of for that purpose, which renders the third an indispensable companion to the two first volumes.

The Author has given a farther account of Silk, and a representation of that splendid insect, the Tusseh Moth of Bengal, with its caterpillar, one of those larvæ which produce silk.

PREFACE.

The intention of the following little work is to give a popular view of the habits and economy of the most elegant of the Linnean orders of Insects, and, from the attractive beauty of the objects, to excite in the reader some inquiry into their history, which, although by no means so striking as that of many other departments of Entomology, is nevertheless sufficiently wonderful to deserve our admiration.

There are but few individuals who have not been struck with the resplendent and gorgeous colours of some of the Butterfly tribe: and where is the human being who can behold even the most simple and unadorned of the species, (the common Cabbage Butterfly,) without associating with it "the scenes of his childhood, so dear to the heart," when chasing the wayward roamer from field to field? Who can meet with *the pupa of* one of these animals, without feeling

anxious to become acquainted with the extr
dinary process by which so singular a produc
is transformed into an animal of such beaut

There are few who have not, at one pe
of their lives, suffered in some way from
consuming powers of the caterpillars of vari
tiny Moths, who find ways of insinuating th
selves into the inmost recesses of the n
sacred repositories, and, if undisturbed, qui
destroy the finest cloths and most valuable f
The means by which they effect this, forms
the least interesting part of their history.

Part of our inquiry will embrace the inst
and economy of an animal which has, for r
two thousand years, contributed to our co
the elegance of our attire, and our comf
and mercantile prosperity,—namely, th
worm Moth. Of the millions who wear
form or another, the beautiful and
fabrics manufactured from the cocoo
little creature, how few, comparative
any thing of the habits of the animal
it is produced! On this division of

I have been pretty full, showing the extent and importance of the manufacture to Great Britain, as well as to many Continental States. If I have descended to too statistical a detail, I trust the importance of the subject will make amends for what naturalists might consider as a fault.

In the selection of illustrations, I have in some instances been guided more by the singularity of the shape and markings of the insect, than by the beauty and variety of the colours. It is not pretended that the figures are by any means entitled to consideration as works of art, but, such as they are, it is presumed that a work, requiring the same labour, and executed in a similar style, has not before been offered to the public at so cheap a rate; even on the Continent, where the price of labour is so much less than in Great Britain, and where paper is little more than half the price that it is in this country.

I have chosen the Linnean arrangement in preference to that of Latreille, or other celebrated modern authors: not that I think it *more perfect*, but because it will be more easily

understood by the general reader, for whose the book is chiefly intended. I have, at same time, as much as possible, stript the scriptions of such terms as can be underst only by the technical entomologist.

When the reader has perused this bo which embraces so trifling a department Entomology, I hope that he may be induced dip deeper into a science which, although it been much neglected, abounds nevertheless wonderful and diversified manifestations creative wisdom. It contains, besides, obje of equal beauty to any other department Natural History, possessed of forms which, not so grand as that of the noblest of anima beings, are certainly more remarkable for singularity of their conformation, and the s king peculiarity of their habits.

Entomology is, of all branches of natu science, the most comprehensive. There appe to be no limits to it; and I am convinced, t of the minuter species we do not know a fifti part. *Microscopic* investigation has shown, [1]

so far as the power of a lens could lead us, the most minute insect we have yet discovered, is liable to be inhabited by a parasite still more minute than itself. The mind of man, in the contemplation of phenomena so astonishing, is lost in wonder.

Although Entomology met with some attention from the earliest natural historians, yet it has, till very lately, been much neglected, from the circumstance of its being considered a trifling and childish pursuit. We are told by Harris, in his description of the Plantain, or Glanville, Fritillary, (Plate 22. of this work,) that "This Fly took its name from the ingenious Lady Glanville, whose memory had nearly suffered for her curiosity. Some relations that were disappointed by her Will, attempted to set it aside by acts of lunacy; for they suggested, that none but those who were deprived of their senses would go in pursuit of Butterflies. Her relations and legatees cited Sir Hans Sloane and Mr Rae to support her character. The *last gentleman* went to Exeter, and on the trial

satisfied the judge and jury of the lady's laud able inquiry into the wonderful works of Creatior and established her Will." *

The accomplished and amiable Sir Josep Banks, it will be remembered, came under th satirical lash of Dr Walcot's pen for a simil reason. But, notwithstanding, he has left be hind him an imperishable name.

Another cause why this inexhaustible an interesting study till lately made so little pro gress in Britain, was the want of elementar books. But this is now completely obviated, firs by the delightful and amusing *Introductio to Entomology*, by Messrs Kirby and Spence in four volumes, the first of which appeared i 1815; and, subsequently, by the more technica Introduction of Mr Samouelle; and, still mor recently, by the popular productions of Profes sor Rennie, entitled *Insect Transformations Insect Architecture*, and *Insect Miscellanies*

The pursuit of nature carries along with i many charms, and there is no division of th

* Harris's *Aurelian*, p. 27.

subject beneath the attention of man. "Even in favour of the mere butterfly hunter, he who has no higher aim than that of collecting a picture of Lepidoptera, and is attached to insects solely by their beauty or singularity, it would not be difficult to say much. Can it be necessary to declaim on the superiority of a people, amongst whom intellectual pleasures, however trifling, are preferred to mere animal gratifications? Is it a thing to be lamented, that some of the Spitalfield weavers occupy their leisure hours in searching for Papilio Adonis, and others of the more splendid Lepidoptera, instead of spending them in playing at skittles, or in an alehouse? Or is there, in truth, any thing more to be wished than that the cutlers of Sheffield were accustomed to employ their *Saint Mondays*, and to recreate themselves after a hard day's work, by breathing the pure air of their surrounding hills, while in search of this 'untaxed and undisputed game?'"*

Crabbe, in his poem of *The Borough*, beau-

* Kirby and Spence's *Introduction* to Entomology, vol. i. p. 43.

tifully illustrates the pleasure to be derived from pursuits of this kind:—

Oft have I smiled the happy pride to see
Of humble tradesmen in their evening glee,
When of some pleasing fancied good possest,
Each grew alert, was busy, and was blest;
Whether the call-bird yield the hour's delight,
Or, magnified in microscope, the mite,
Or whether tumblers, croppers, carriers, seize
The gentle mind, they rule it, and they please.

There is my friend the weaver,—strong desires
Reign in his breast; 'tis beauty he admires:
See! to the shady grove he wings his way,
And feels in hope the rapture of the day;
Eager he looks, and soon to glad his eyes,
From the sweet bower by Nature form'd, arise
Bright troops of virgin moths, and fresh-born butterflies,
Who brake that morning from their half-year's sleep,
To fly o'er flowers, where they were wont to creep.

Above the sovereign oak, a sovereign skims,
The Purple Emp'ror, strong in wing and limbs;
There fair Camilla takes her flight serene,
Adonis blue, and Paphia, silver queen;
With every filmy fly, from mead to bower,
And hungry Sphinx, who threads the honey'd flower
She o'er the Larkspur's bed, where sweets abound,
Views ev'ry bell, and hums the approving sound;
Poised on her easy plumes, with feeling nice,
She draws from every flower, nor tries a floret twice.
He fears no bailiff's wrath, no baron's blame,
His is untax'd and undisputed game.*

* Page 110.

We hope the time is now gone by when a defence of any department of natural history is necessary. Should any one ask what is the use of the pursuit, we would answer, first, that in a contemplation of the many wonders which present themselves, even in the study of Butterflies, Sphinges, and Moths, there will be found much to excite our admiration, and sufficient to show us that a knowledge of their history enables us to guard against the ravages of some of the destructive species. It also enables us to turn the produce of others to highly useful purposes, and even to give employment to tens of thousands of our fellow men. But a consideration, of a still higher kind than its palpable utility, recommends the study of Nature to mankind: it is an inexhaustible source of rational and innocent amusement, and a delightful exercise of our reasoning faculties. In surveying the wondrous works of Creation, even in the simplest of forms, we are naturally led to admit the truth of the maxim, that "the contemplation *of Nature raises* the mind up to Nature's God."

There can hardly remain a doubt, that all works were designed to afford His rat creatures useful and pleasing instruction. wisest of men says, " Go to the ant, sluggard, and be wise."* The inspired miah says, in reference to the knowledge o stork and swallow, that they are aware of " appointed times," and " the times of coming."† Our Saviour directs the atte of man to the fowls of the air, and the lil the field, as affording good moral lessons. Paul, in his refutation of the gainsayers in philosophical unbelief, impugns their false trines, by an illustration of the possibility c resurrection from the dead, drawn from the nary process of vegetation.‡ A closer an will, however, I think, be found in the tra mation of Insects; as is more fully illust in our observations on the Ocellated Sphi

Wherever the student of Nature turn eye, he perceives objects which comman

* Proverbs, vi. 6. † Jeremiah, viii.
‡ *Corinthians*, xv. 36, &c. ‖ Plate 62.

admiration and his wonder; deep reflection on these leads him to

> Find tongues in trees, books in the living brooks,
> Sermons in stones, and good in every thing.

"In a *moral* view," says an anonymous writer, "I shall not, I believe, be contradicted when I say, that, if one train of thinking be more desirable than another, it is that which regards the phenomena of nature with a constant reference to a supreme intelligent Author. To have made this the ruling, the habitual sentiment of our minds, is to have laid the foundation of every thing which is religious. The world thenceforth becomes a temple, and life itself one continued act of adoration. The change is no less than this; that whereas, formerly, God was seldom in our thoughts, we can now scarcely look upon anything without perceiving its relation to Him. Every organized natural body, in the provisions it contains, for its sustentation and propagation, testifies a care on the part of the Creator, expressly directed to these purposes. We are on all sides surrounded by such

bodies—examined in their parts, wonderfu
curious—compared with one another, no l
wonderfully diversified—so that the mind,
well as the eye, may either expatiate in vari
and multitude, or fix itself down to the inv
tigation of particular divisions of the scien
And in either case it will rise up from
occupation possessed by the subject in a v
different manner, and with a very differ
degree of influence, from what a mere assent
any verbal proposition which can be form
concerning the existence of the Deity—at le
that merely complying assent with which th
about us are satisfied, and with which we
too apt to satisfy ourselves—will or can prod
upon the thoughts. More especially may t
difference be perceived in the degree of admi
tion and of awe with which the Divinity
regarded, when represented to the understa
ing by its own remarks, its own reflections,
its own reasonings, compared with what is e
ted by any language that can be used by oth

INTRODUCTION.

wonderful metamorphoses of insects affords
ing subject of contemplation to the human
and what in early ages seems to have been
as an undoubted fact, especially by the
, and Romans, was held to be merely imagi-
ı Britain, so late as the year 1634. Sir Theo-
.ayerne, who edited Mouffet's work on insects,
d, *Insectorum sivi Animalium Theatrum*,
" that if animals are transmuted, so may
."

se astonishing and diversified transitions in
sect tribes, so well known to the ancients,
colouring to, and excited a belief in, many
metamorphoses recorded by their poets. They
tterly unacquainted with the truths of modern
logical discoveries, so that the fact of a cater-
ɔeing transformed into a butterfly, must have
ed to them sufficient to upset all unbelief in the

transmigration of souls. There can be but little doubt that the principles of metempsychosis originated from this cause. Nothing could appear to them more confirmatory of the doctrine, than that an inert aurelia should be again transformed into a living body. The only method they had for accounting for this was, that it had been tenanted by the soul of some wretch whose misdeeds on earth had merited such a pilgrimage.

In the institutes of Menæ, we are told that a priest who has drunk wine, shall migrate into a moth or fly, and be doomed to feed on ordure; and that the man who steals gold from a priest, shall inhabit a thousand times the bodies of spiders. If any one steal honey, he shall be reborn a great stinging gnat. Shakspeare puts the same idea into the words of old Christopher Sly, the drunken tinker, in the Induction to the *Taming of the Shrew*. "Am I not old Sly's son, by birth a pedlar, by education a card-maker, by *transmutation* a bear-herd, and by profession a tinker?"

The story of the phœnix arising from its own ashes, is no doubt of similar origin. The tradition is, that it lives five or six hundred years in the wilderness, and when thus advanced in age,

f a pile of sweet wood and aromatic gums, and
ıg it with the wafting of its wings, thus destroys
lf; while from its ashes arises a worm, which in
ıe grows up to be again a phœnix.

In the *Annals of Tacitus*,* it is stated, that, in
› year 787 of Rome, the phœnix revisited Egypt,
ıich created much speculation among the learned.
ıe accounts of the longevity of this creature vary
m five hundred to one thousand five hundred
ars. It was considered sacred to the sun.

The ancients made many allusions to the wonder-
changes which the insect tribes undergo, and
ilt a number of their fictions on them. The my-
›logical tale of Cupid and Psyche, is an allegory
the human soul, which is sometimes cherished,
d sometimes tormented by the passions. Psyche,
Greek ψυχη, signifies the soul, as also a butterfly;
›wing that the ancients were sufficiently struck
th the transformation of the butterfly, and its
rival from a seeming temporary death. Cupid is
emblem of desire. Psyche is frequently repre-
ıted by a butterfly, not merely from the beautiful
pearance of that insect, but on account of its sur-

* Book vi. sect. 28.

viving the chrysalis condition; and this breaking from its confinement, certainly finely designates man's future existence, after he shall rise from the dead. This fable is perhaps the invention of Apuleius, as no mention of Psyche, nor any allusion to such amours of Cupid, occurs in any Greek or Latin writer of an earlier date. Apuleius calls it an old woman's story; and puts it into the mouth of an old hag in a cave of robbers, to sooth the grief of a young lady their captive.

It is worthy of remark, that the figures of Cupid and Psyche embracing, are found on many of the gems called Abraxas, from the name of the Egyptian deity, whose worship the Gnostics and Basilidians in Syria and Egypt contrived to blend with misconceived notions of Christianity. These gems were used as amulets, or charms, against various maladies and perils.

The learned senator Philip Buonarotti, attempts to show that the fable of Cupid and Psyche is derived from the solemn mysteries of love, celebrated among the Thespians, &c., and carefully concealed from the profanation of the vulgar eye. It is highly probable that of the many gems in which the God of Love *variously represented*, with or without the b

a great number are anterior to the time of Apuleius, and allude to sacred ceremonies: that the butterfly was displayed in these rites as a symbol of the soul; and that the gems which bear the figure of Cupid chasing, tormenting, caressing, and sporting with a butterfly, are emblematic of desire acting on the human soul: but it does not follow that they have any allusion to a fiction resembling that of Apuleius. They are probably founded on allegories of more ancient and more sublime invention.

These days are gone by; the metamorphoses, now thoroughly known, have been stript of their tales of marvel.

The transformations of insects, more correctly speaking, consist rather in a series of developments than in any absolute metamorphosis; being only a transition of changes in organs which lay concealed from human view, the caterpillar being compound in its nature, with the germs of the *imago* state hidden in a succession of cases. The first is the covering of the pupa, which is concealed within three or four mantles, the one over the other; these will in succession enrobe the larva, and, as it enlarges, the parts become visible, and are alternately thrown off, until *the perfect insect* emerges from its confinement.

The celebrated Swammerdam found, by dissection, the skins of the larva and pupa enveloped in each other, and also the butterfly with all its organs, but these in a fluid state. Malpighi discovered within the chrysalis of a silkworm, that was only a few days old, the eggs of the future moth: and those of the *Bombyx dispar* were discovered by Reaumur within the caterpillar, only seven days before its change into the aurelia state.

Although these discoveries disprove all miraculous intervention, still we are wonderstruck on reflecting that this simple larva, when first it emerges from the egg, not thicker than a thread of silk, should contain its own triple, or in some cases its octuple covering,—the mask of an aurelia and a butterfly, folded in the most astonishing manner over each other; and besides these, different respiratory and digestive organs, a nervous system, and muscles of motion peculiar to each stage of its existence. It is inconceivable how these successive changes should be effected, through the agency of the food which it takes into its stomach during the caterpillar stat And what is still more incomprehensible, is, th *this stomach*, at one time, is incapable of digest *vegetable food*, the nectar of flowers being

contain. In this perfect condition, it is deprived of the very organs by which it could feed on vegetable matter, and is supplied by a proboscis for sipping the honey. It is no less remarkable, how, at one period of its existence, it emits from that stomach a substance for the formation of silky filaments, which, in its imago condition, it is incapable of doing.

The knowledge of all these facts shut out the strict analogy which existed, before their discovery, between the transformation of lepidopterous insects, and the resurrection of the human body; yet it affords a striking picture of that eventful change. Swammerdam, the very person whose discoveries have rendered this analogy less complete than it had been before his time imagined, was nevertheless deeply impressed with the singular transitions, and says, "this process is formed in so remarkable a manner in butterflies, that we see therein the resurrection painted before our eyes, and exemplified so as to be examined by our hands."*

The Rev. Mr Kirby makes this interesting allusion to the subject: "But although the analogy between

* *Hill's Swammerdam*, vol. i. p. 127, a.

the different states of insects, and those of the l
of man, is only general, yet it is much more com
with respect to his soul. He first appears in this
body—a child of the earth—a crawling worm-
soul being in a course of training and preparatio
a more perfect and glorious existence. When it
finished this course, it casts off this vile body,
goes into a hidden state of being in Hades, whe
rests from its works, and is prepared for its
consummation. The time for this being arrive
comes forth clothed with a glorious body, not lik
former, though germinating from it, for though
was sown an animal body, it shall be raised a sp
ual body,' endowed with augmented powers, facul
and privileges commensurate to its new and he
state. And here the parallel holds perfectly betv
the insect and the man. The butterfly, the re
sentative of the soul, is prepared in the *larva* fo
future state of glory; and if it be not destroyed
the Ichneumons and other enemies to which
exposed, symbolical of the vices that destroy
spiritual life of the soul, it will come to its stat
repose in the *pupa*, which is its Hades; an
length, when it assumes the *imago*, break forth
new powers and beauty to its final glory,

n of love. So that, in this view of the subject, l might the Italian poet exclaim,—

Non v'accorgete voi, che noi siam vermi,
Nati a formar l'angelica farfalla?"*

hese ideas are beautifully developed in the fol- ing little poem, in which the progress of the ct is correctly depicted:—

THE BUTTERFLY'S BIRTHDAY.

The shades of night were scarcely fled,
The air was mild, the winds were still,
And slow the slanting sunbeams spread
O'er wood and lawn, o'er heath and hill.

From fleecy clouds of pearly hue
Had dropt a short but balmy shower,
That hung like gems of morning dew
On every tree and every flower.

And from the blackbird's mellow throat
Was pour'd so loud and long a swell,
As echo'd with responsive note
From mountain side and shadowy dell.

When, bursting forth to life and light,
The offspring of enraptured May,
The Butterfly, on pinions bright,
Lanch'd in full splendour on the day.

* Do you *not perceive* that we are caterpillars, born to form the an- *butterfly?*

Unconscious of a mother's care,
No infant wretchedness she knew;
But as she felt the vernal air,
At once to full perfection grew.

Her slender form, ethereal light,
Her velvet-textured wings enfold;
With all the rainbow's colours bright,
And dropt with spots of burnish'd gold.

Trembling with joy a while she stood,
And felt the sun's enlivening ray;
Drank from the skies the vital flood,
And wonder'd at her plumage gay!

And balanced oft her broider'd wings,
Through fields of air prepared to sail;
Then on her vent'rous journey springs,
And floats along the rising gale.

Go, child of pleasure, range the fields,
Taste all the joys that Spring can give,
Partake what bounteous Summer yields,
And live, whilst yet 'tis thine to live.

Go, sip the rose's fragrant dew,
The lily's honey'd cup explore,
From flower to flower the search renew,
And rifle all the woodbine's store;

And let me trace thy vagrant flight,
Thy moments, too, of short repose,
And mark thee then with fresh delight
Thy golden pinions ope and close.

But hark! whilst thus I musing stand,
Pours on the gale an airy note;
And, breathing from a viewless hand,
Soft silvery tones around me float!

They cease—but still a voice I hear,
A whisper'd voice of hope and joy,
"Thy hour of rest approaching near,
Prepare thee, mortal! thou must die!

"Yet, start not!—on thy closing eyes
Another day shall still unfold,
A sun of milder radiance rise,
A happier age of joys untold.

"Shall the poor worm that shocks thy sight,
The humblest form in Nature's train,
Thus rise in new-born lustre bright,
And yet the emblem teach in vain?

"Ah! where were once her golden eyes,
Her glittering wings of purple pride?
Conceal'd beneath a rude disguise,
A shapeless mass, to earth allied.

"Like thee the hapless reptile lived,
Like thee he toil'd, like thee he spun,
Like thine his closing hour arrived,
His labour ceased, his web was done.

"And shalt thou, number'd with the dead,
No happier state of being know?
And shall no future morrow shed
On thee a beam of brighter glow?

"Is this the bound of power divine
To animate an insect frame?
Or shall not he who moulded thine,
Wake at his will the vital flame?

"Go, mortal! in thy reptile state,
Enough to know to thee is given;
Go, and the joyful truth relate,
Frail child of earth, high heir of heaven!"

It would be difficult to assign a cause, why insects undergo so many changes before arriving at a state of maturity. Why is it that they do not, like other animals, preserve the same general form from infancy to perfection? This is a question which is not easy to answer, but no doubt the thing was wisely ordered by the Creative Power. We know, however, that one very important part is assigned to insects,—that of destroying the redundancy of decaying animal and vegetable matter; and in performing this office, few agents could be more effectual; for, in the larva state, they are not only extremely voracious, but possessing a stomach nearly the size of their whole body, and having rapid digestive powers, are capable of consuming an immense quantity of food. The period of their existence is by far the longest. *Having allayed* their almost insatiable voracity *and completed* the materials for the develop-

those organs which are destined to form their ture corporeal condition, they become an aurelia, ring which state they are quite inert, and without y cravings of hunger. Thereafter they assume e imago, or perfect condition, when, in general, eir stomachs are contracted to a tenth of their mer capacity; and they frequently exist without od at all, or only sip the nectar of flowers. After is period, the chief aim the animal seems to have view, is to propagate its kind, and no other object r divert it from its purpose.

The new relations which this singular arrangement introduces into nature, are not less wonderful an striking; for one individual animal combines itself three animals, in all respects specifically fferent, whose manner of existing, and alimentary ourishment, are diametrically opposite.

Several of the vertebrate animals, such as frogs, ads, and water newts, undergo metamorphoses in me respects analogous to those of the insect tribes; e first form of these being a tadpole, which is idely different from that which they afterwards sume. These reptiles, too, as well as snakes, cast eir skins by an operation somewhat similar to the *ese of insects.* There is nothing, however, in

their metamorphosis at all resembling the pupa, chrysalis state in insects.*

All insects pass through four states,—namely that of the egg; the larva, or caterpillar; the pupa or chrysalis; and the imago, or perfect insect. It called by Linneus, because the creature has thrown off its mask, and has become a perfect *image* of its species. These different forms I shall treat in succession. The egg state will apply to the whole order; but I shall only enter into a general account of the physiology of the larvæ condition, as applied to the three genera, Butterflies, Sphinges, and Moths and give a detailed account, in the first instance of Butterflies; reserving the most singular facts which are connected with the history of Moths, to precede the description of the animals of that genus.

When we alter the soil of a country by agricultural operations, plants will follow, of their own accord, the progress of man's improvement; and wherever plants are introduced, animals are certain to find their way thither. It would be difficult to give a satisfactory account how this takes place. Let brassicas be introduced into the most remote

* *See* KIRBY and SPENCE, Intr. v. pl. i. p. 81.

valleys, which were formerly the receptacles for dry heaths and furze, if they increase to any extent, caterpillars will certainly be found in them; if nettles are by any means introduced, the beautiful butterflies which feed on them are sure to be found there; and as these again increase, insectivorous birds will become resident on the spot. In confirmation of this fact, Mr Loudon says, "Having made some oak plantations, though only on a small scale, near my residence, I have occasionally found therein *Thecla quercus*, (Purple hair-streak Butterfly,) and *Militæa euphrosyne*, (Pearl-bordered Fritillary,) insects which previously had never been seen within some miles of the spot. I have seldom planted the Athenian poplar without finding it taken possession of by *Smerinthus populi*, (Poplar Hawk Moth,) and *Cerura Vinula*, (Puss-Moth,) and by other less common *Phalænidæ*. The copious growth of broom in our plantations induced, for several seasons, the appearance of *Phalæna Spartiata*, (the Broom Moth, *Chesias Spartiata* of Stephens,) a species which I had not observed before, and which has disappeared again since the removal of the broom on which the larva feeds. The Caterpillar of *Acherontia Atropos*, *Death's-head* Sphinx,) it is well known, feeds on

the potato, the very extensive cultivatio
vegetable root in the present day, wil
account for the far more frequent occ
this fine insect of late years than forme
are informed, by an able practical ent
that some of the fir-feeding Lepidoptera, (t
Sphinx pinastri and *Geometra piniari*
formerly occurred in scarcely any other p
island, save Scotland or the north of Engl
of late years, since the growth of firs has
extensively encouraged, been taken, one
them, in great abundance in the more north
The same law, or something analogous t
good also in the vegetable world. Plants
spring up, as it were spontaneously, o
nobody knows how, as soon as the soil an
are rendered suitable to their growth."

The field of Nature is of vast and ever
extent, and the objects which lie within
ceedingly numerous and diversified. To
therefore, that has acquired a relish for cu
knowledge of natural objects, it never fail
an inexhaustible source of amusement.

* See HAWORTH's *Lepidoptera* Brit. p. 27

The physical sciences have a strong tendency to rrest the attention of the youthful mind, being eplete with striking phenomena; and, in mature years, few can pursue the study of Nature without acquiring an ardent zeal for the extension of their knowledge. The varied forms which daily present themselves to the inquiring eye, give the mind a strong bias for observation and reflection. Hence the utility of introducing natural history as a preliminary branch of education; and it would be well if people of rank and fortune would see the importance of instilling a love of the natural sciences into the infant minds of their offspring, when they are yet alive to the influence of early impressions. They might thus be preserved from those ignoble pursuits which are the too general concomitants of wealth and rank.

THE

BOOK OF BUTTERFLIES.

CHAPTER I.

ON THE PHYSIOLOGY OF THE EGGS OF PAPILIONACEOUS INSECTS, AND THEIR MODE OF HATCHING, &c.

BUTTERFLIES, Sphinges, and Moths, like the whole known species of insects, are strictly oviparous animals.

There is an unerring foresight possessed by the female, that of depositing her eggs in the precise place where food, suitable to the existence of the caterpillar after its exclusion, is found. With very few exceptions the eggs are enveloped in an adhesive cement, which fixes them to the spot on which they are deposited. When eggs are extruded singly, this cement generally envelopes each individual with a thin coating, as in the case of the Admirable Butterfly, (*Vanessa atalanta*;) but when they are deposited

in groups, the cement is generally spread over whole, as in the instance of the White Satin M (*Leucoma Salicis* of Stephens.) This gluti substance is evidently intended by nature to pre the eggs from being carried from the place sele by the mother insect for their depository. *Hipparchia Hyperanthus*, another butterfly, dep her eggs at random, on different plants. The c pillar of this insect is polyphagous. It has observed that all larvæ which live in solitude, ceed from eggs laid singly by the female butte which is provided with an instrument for the pose. De Geer mentions, that these eggs are in s instances deposited with great rapidity; especi by the Common Moth, called in many place England the Ghost, (*Hepialus Humuli.*) insect lays a large number of minute black resembling the grains of fine gunpowder. She ej them so fast, and with such force, that their ex sion resembles the shot from a pop-gun.

It is a curious fact that the female insects of t whose larvæ spend a solitary life, or those which in societies, take the utmost care to deposit t eggs in a manner corresponding to the stat which the future caterpillars are destined to ex

Several species of Moths cover their eggs wi thick coating of the hair stripped from their bodies. This is particularly the case with the *A chrysorhœa*, and *Hypogymna dispar*. They pl

off this hair with the pincers, which are at the point of their ovipositors. A downy-like bed is first formed on the surface of some leaf, upon which they place in succession layers of eggs, taking care to surround them with a coating of a similar kind. When they have deposited the whole number, they lay a neat thatched-like roof of hair over the surface.

These little creatures are endowed with a peculiar instinct, which looks remarkably like intelligence; for the hairs employed in forming the inside of the nest are placed promiscuously, while those used for the external covering, are arranged with perfect regularity, and such skill, that they render the nests impervious to water; one layer lies over the other, with such neat precision, that, as Mr Kirby says, the whole resembles a well-brushed piece of shaggy cloth, or fur. When the female has finished her labour, in which she is usually employed about twenty-four hours, and in some cases forty-eight, her body, which was before thickly beset with hair, is now rendered quite naked. She has thus denuded herself for her offspring's sake, and, having completed the last task assigned to her by Nature, she finishes her earthly pilgrimage, and expires.

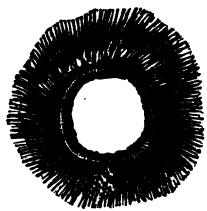
Creative power has made provision for the fulfilment of all these singular instincts in a wonderful manner. The little Gipsy Moth (*Hypogymna dispar*) does not exist in its perfect condition more than fourteen days, and often not more than a week.

The male is not furnished with this dow
of no use to him.

When the female Gipsy Moth is on t
laying her eggs, she places herself on the tr
elm or oak, and always with her head do
In this situation she continues to place her
above the other, in the shape of an inver
Her first care is to make a small bed of d
which she places the egg intended to form
and the egg being covered with a glutinous s
attaches itself to all the fine downy hair, a
same time adheres to the tree. In this em
she continues for many hours, adding to
and taking rest at intervals; and as freque
she protect her eggs by a layer of down.
lowing is a representation of the Gipsy Mo
act of laying her eggs, with the shape of
when completed. The cut represents
half the size of nature.



Professor Rennie mentions having picked up some pecimens of the Gipsy Moth in the Netherlands, nd enclosed them in chip boxes. On opening one f these some time afterwards, he found that one of he moths had deposited her eggs; but, owing to the ituation not being favourable, they were laid in the im of a wheel, of which her body was the radius, s represented in the following figure:



The rim of this wheel was about a quarter of an ıch broad, and regularly sloped like a candle shade, nd had down laid all around it in an imbricated ıanner. Another of these captives, although in a ox of the same size as the other, instead of forming wheel, laid the eggs in a conical form, like a little ıound. The Professor conceives that this form ıight have been assumed in consequence of the ıoth, in all probability, having laid part of the eggs efore being captured, as it did not contain above a ıxth of the number which the other deposited. The ıme general slope was, however, preserved, and it ras as regularly thatched as the other, as represented ı *the following figure*:



These eggs produced, when in the possession of Mr Rennie, in April 1830, a numerous brood of caterpillars.

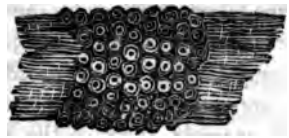
As these eggs are laid in August, and destined to endure the storms of winter, the female seems to have some foresight of this, in forming so compact and appropriate a covering, constructed on principles equal to the best devised methods of human ingenuity. It is the spring of the year before they are hatched, when the elm comes into leaf.

The whole number of eggs laid by one female is frequently placed in a single group, and at other times in several smaller ones; either considerably apart, on the same plant, or on others which are contiguous. The parent insect seems to hold in view in the latter case, the impropriety of oviposition more in one situation than will supply the quantity of food sufficient to satisfy the wants of the exclu caterpillars.

There is great diversity in the arrangement the eggs after extrusion. Sometimes they are deposited in confused masses; but in general, they arranged in the most orderly and even systematic manner. The common Cabbage Butterfly, various other insects, place their eggs upon one *ranked close* together in perfect order: b

arrangement the larvæ, which on hatching emanate from the upper end, cannot disturb the adjoining eggs. The eggs of many Papilios are so formed, that it is evident they are intended to be placed in this position. For example, those of the Puss Moth (*Cerura Vinula*) have the case of a gummed transparent substance, while the rest is cinereous and opaque. The Emperor Moth lays eggs, by which the caterpillar can make an easy retreat; these are piled on their side, in the same manner as bottles of wine in a cellar.

The Lacky Moths (*Clisiocampa neustria,*) deposit their eggs on the twigs of trees, on which they are arranged with such extraordinary regularity and neatness, that they resemble pearls set by the hand of the most skilful jeweller. Hence the name given to them by gardeners of "Bracelets." They are deposited in close spiral circles, of from fifteen to seventeen distinct rows, having their interstices filled up with a tenacious brown gum, which secures them against the winter's cold, and preserves them from the attacks of devouring insects. Each of these depositions consists of two or three hundred pyramidal eggs with their tops flattened, having their axes perpendicular to the circumference of the twig to which they are attached, which will be more easily understood by the following figure:



It is not very easy to imagine how these lit animals can accomplish this beautiful arrangeme by means of their tail and feet, in such a mann that the hand of man could not perform it wi greater exactness and nicety. The ingenious Rea mur made many ineffectual attempts to investig this operation, but in vain. He reared numbers the moth from the eggs, and supplied the fema with appropriate twigs; but they most pertina ously avoided the accustomed symmetrical re larity of their kind, and extruded their egg random.*

The following is a representation of the eg some unknown moth, which in some years m seen rather plentifully in orchards, deposited manner very similar to that of the Lackey M



In depositing its eggs, the female Vapou (*Orgyia antiqua*) takes care to avail herr

* Reaumur, i. p. 95.

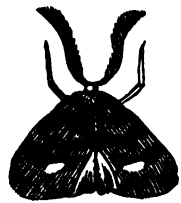
pupa case, which she has recently left. This envelope is lined with a fine soft silky substance, which forms a comfortable asylum for the eggs. Swammerdam says, that "this custom of fastening the eggs to the web in a constant method, and by the immutable law of Nature, is so peculiar to this species of insects, that I have never observed it in any other kind whatsoever. This female, like a most prudent housewife, never leaves her habitation, but is always fixing her eggs to the surface of the web out of which she has herself crept, thus affording a beautiful instance of industrious housewifery."

A strong reason for the domesticated habits of this female moth, is her wings being so very short that they are of little use in rendering her buoyant; and of that description which naturalists call rudimentary wings. This is also the case with the females of some other moths. So different are these females from the males, that they may be taken for animals of distinct genera. Their bodies are broad and thick, in proportion to those of the males, and the wings excessively small, as will be seen by the following figure of the female Vapourer Moth:



On the other hand, the wings of the male are

extremely large, in proportion to the size of the body, as exemplified in the figure beneath:



There can be little doubt that the silken web keeps the eggs in a proper temperature during winter. These cocoons are besides always under the shelter of some wall, or in the hollow of a tree. Silk is known to be an excellent non-conductor of electricity, and therefore must preserve the eggs in an equable temperature. The following is the appearance presented by the eggs laid in the cocoon, from which the female has issued:



I shall revert to this subject again, when treating of Moths, and give examples of many peculiarities in the different species, and of the manner in which they deposit their eggs.

In reference to the degree of cold which the *eggs of insects can* endure, I shall give the inge-

periments of John Hunter and Spallanzani on this interesting subject. Indeed, the heat also which they are capable of withstanding, is not less astonishing.

" Intense cold," says Spallanzani, " does not destroy the eggs of insects. The year 1709 was celebrated for the intensity of its cold, and its fatal effects on animals and plants. Fahrenheit's thermometer fell to 1°. ' Who can believe,' exclaims Boerhaave, ' that the severity of this winter did not destroy the eggs of insects, especially those exposed to its influence in open fields, on the bare earth, or on the exposed branches of trees! Yet the general warmth of spring having again tempered the air, these eggs were hatched, and as numerously as in the mildest winters.' Since that time, there have been winters still more severe; for in France, as well as in several other European states, in December 1788, the thermometer fell considerably beneath that of 1709.

" I subjected eggs of several insects to a more severe trial than in the winter of 1709. Among others were those of the Silkworm Moth, and the Elm Butterfly, (*Vanessa polychloris,*) which I enclosed in a glass vessel, and buried five hours in a mixture of the ice and rock salt, when the thermometer fell six degrees below zero; notwithstanding which caterpillars were extruded from all the eggs, and exactly at the same time with those which *had not been* subjected to this experiment. In the

succeeding year, I exposed them to a still greater degree of cold. I prepared a mixture of rock salt and nitrate of ammonia, and reduced the thermometer to twenty-two degrees below zero, which was twenty-three degrees lower than the cold of 1709. They suffered nothing from this rigorous treatment, as they were hatched in due season.

"From these combined facts we must conclude, that cold is less prejudicial to germs and eggs, than to animalcula and insects. In general, it is found that germs can survive the cold of two degrees below zero; while it is known that some animalcula die at the freezing point, and others at about twenty degrees. The eggs of various insects are productive after being exposed to a temperature of twenty-two degrees below zero, while insects themselves die at sixteen and fourteen degrees. This I have proved in the eggs of the Silkworm Moth, and of the Elm Butterfly; and although I ascertained that some insects can stand a great degree of cold, I have invariably found it to be in a much less ratio than what can be resisted by their eggs. What can be the cause of this great difference? Insects killed at sixteen and fourteen degrees, are so completely penetrated and frozen, that their members do not yield to the pressure of the finger, and even under the knife they appear perfect ice. This is not the *case with eggs*; for the contents of the shell, or *crust, remain* quite fluid under the influence of the

greatest cold; which can be ascertained by squeezing them with the nail of the finger. This may arise from their constituent parts being oleaginous or spirituous, or from some inherent principle adapted to resist the power of cold."

We are not at all enlightened by what Spallanzani has offered as a cause why eggs are enabled to resist the effects of cold, as he has given us no satisfactory explanation of the phenomenon.

He proceeds, "If eggs do not freeze, it is probable that the included embryoes do not freeze. Is there anything surprising, therefore, that they are capable of resisting that cold which proves fatal to their contained insect when produced? Perhaps, for the same reason, (and I can perceive no applicable objection,) animalcula concentrated, or in the germ, can support a degree of cold which they are incapable of enduring when emerged.

"It may be asked, as the temperature of freezing still retains a portion of heat, why should it not develop the germs of the most minute animalcula? If we had never seen any eggs hatched but those of birds, which require a hundred and four degrees, we should have naturally concluded that all others required the same. A slight knowledge of the physiology of minute animals, instructs how many kinds produce at a much lower temperature. The eggs of butterflies and many other insects hatch at a temperature so low as forty-five degrees. If these

eggs emerge at fifty-nine degrees lower than is required for the development of birds, what difficulty can we have in believing that at thirteen degrees less than the freezing point, other animals are capable of being hatched? Nor should I be surprised at being told, that there are animals whose eggs would hatch in a much greater degree of cold, after being aware that there are plants, which are beings so similar to animals, that flourish amidst the regions of winter, and even fructify."

From the experiments of John Hunter, we find that a hen's egg will freeze by a great degree of cold, while, at the same time, it is possessed of a principle of vitality which prevents its destruction; but, if once that principle is destroyed, cold operates on it more easily. He mentions that an egg was froze by the cold of zero. After it was thawed, and agai exposed to the same depth of cold, it froze sev minutes and a half sooner. A new laid egg took hour to freeze in fifteen and seventeen degrees; when again exposed, it froze in twenty-five degr in half that time.*

With all these facts before us, we are warrant coming to the conclusion, that cold does not de the vital principle in the eggs of insects; and i been often noticed that, after a severe winter, i were more numerous in the succeeding spri *summer.*

* *See* HUNTER on the *Animal* Economy.

We now proceed to give an account of the substance of the eggs of Lepidopterous Insects. These, ke those of birds, consist, first, of a coat or shell, hich is strong, flexible, and much of the consistence honey. It will not easily yield to the knife. It ntains little calcareous matter, if any at all, and nsequently resists the action of the muriatic and her acids.

With the composition of the fluid, which is ntained in these minute shells, we are not at all quainted, and can only suppose that it is analogous the white and yolk of birds' eggs. When the g has arrived nearly to the time of hatching, the bryo may be distinctly seen by the use of a strong croscope. It is coiled up in an annular form, as the following figure of the egg of a Priest-hawk th, (*Sphinx Ligustri.*)



me of the eggs of this order of insects are ed with hair, or a downy substance, as may tanced in those of the Figure-of-eight Moth *yx cæruleocephala.*)

re is considerable variation in the number of id by different species. The Silkworm Moth, *na mori,*) lays five hundred; the Great Goat *Cossus ligniperda,*) one thousand; and the oth, (*Callimorpha Caja,*) one thousand six

dred. This may be considered extraordina
ndity in such small animals; but, compared
Queen Bee, it sinks into insignificance; for a
trudes the extraordinary number of 2,419,200
lunar month, and exceeds in fruitfulness eve
ther animal in the world.

Some of the larger fishes lay vast numbers of egg
for Lewenhoek has ascertained that the sturgeo
roe contains 1,500,000, and the codfish deposits t
amazing number of 9,000,000.

The eggs of birds are all nearly of the same sha
which is supposed to arise from the similarity of t
form of these animals. The eggs of insects, on t
contrary, are infinitely varied in their forms, and w
this should be the case, it is not easy to conjectu
Dr Paley has justly remarked in his *Natural Theol*
that the cause of these differences of forms is, for
most part, concealed from human investiga
Besides the dissimilarity of shape, they have a
racter which distinguishes them from all the
of other oviparous animals, being for the mos
externally ornamented with a variety of be
figures. Some are figured on one side, and p
the other; while the eggs of the Tusseh Sil
(*Attacus pappea,*) and some other of the
the division Bombyx, are always orbicular,
pressed with a central cavity above and b
have their circumference crossed with
corresponding with the rings of the enclo

There are others which are figured all over. In t
butterfly *Hipparchia Ægeria*, all the surface
covered with hexagonal reticulations, as under :



In the new and restricted genus *Vanessa* of the
French authors, we find two species of butterflies,
which differ but little in their forms, the chief dis-
nction being, that the one is much larger than the
her : yet the eggs are so dissimilar, that they would
licate insects of a totally different form. Those of
small Tortoise-shell Butterfly are of a cylindrical
pe, with eight prominent ribs, as under :



the eggs of the large Tortoise-shell Butterfly
flask shape, and quite smooth, as represented
1 :



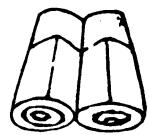
The following are striking varieties of the eggs of Moths:

AN EGG OF THE ANGLE SHADES MOTH.



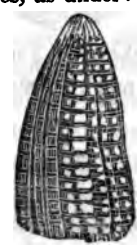
This egg greatly resembles an Echinus or Sea Urchine.

TWO EGGS OF THE LACKEY MOTH.



These are widely different from any we have yet represented, and yet, in the insects themselves, there is but little variation of form.

The eggs of the Cabbage Butterfly are of an upright longitudinal shape, neck very finely ribbed, not unfrequently concealed by elevated ridges, crossing them at right angles, as under:



Those of the Meadow Brown Butterfly (*Hipparchia Janira*) are crowned by imbricated scales like the tiles of a roof, as in the following figure:



The period of hatching varies according to the state of the atmosphere. A certain degree of heat is also necessary to the exclusion of the caterpillar. This heat is in most instances derived from the state of the air; but other causes sometimes produce it. Those species which have several broods in the year, —such as the Nettle Tortoise-shell Butterfly, are hatched in a few days after they are laid; but should the female lay late in the autumn, the eggs remain in a state of hybernation till the succeeding spring. That this condition and difference are attributable to the influence of temperature, has been proved by numerous experiments. These late laid eggs may be hatched by placing them in the temperature of summer heat. The Silkworm is never hatched till six weeks after its extrusion. However, by artificial *means, the ordinary laws* of nature may be altered; *for in countries* where they are much propagated *on account of the silk,* it is the practice for worms

to hatch them in less than a month, by carrying the eggs in their bosoms.

Kirby and Spence assert, that "to retard their hatching with particular views is in any circumstances impossible. When the heat of the atmosphere has reached a certain point, the hatching cannot be retarded by cellars; and M. Faujas has remarked, that in time the Silkworm's eggs would hatch in an ice-house." *

Contrary to the above assertion, in one instance,—and indeed the only time I ever tried the experiment,—I found that, by placing the eggs of a Silkworm Moth in a cold damp cellar, they were kept from hatching from the year 1818 till the year 1820, when they were exposed to the sun's heat, which speedily brought them to the larva state. Young, in his *History of France*, states, that no art will hatch the eggs of the common Silkworms the first year, or that in which they are laid; but that there is a species brought from Persia, which are hatched three times a-year, and which will break from the egg in fifteen days, under a proper temperature. But it is stated, as a circumstance out of the ordinary laws of Nature, that in the year 1765, the common sort hatched in the first year.

In some species, the caterpillar is some hours in *extricating itself* from the shell at hatching. In the

* *Introduction to Entomology*, iii. p. 102.

e of the *Satyrus mœra, Saturnia pavonia,* rious others, the shells are furnished with a lid, which, when the larva is completely ped, it can force up, and emerge at pleasure.*

of the most remarkable circumstances con- with the eggs of insects, is, their great specific r. From all the experiments which have ade, it has been found that they sink rapidly er. This has been the case from the largest has been tried, namely, those of the Drinker (*Odonestis Potatoria,*) which is almost the a hempseed, to that of the rose plant, *Aphis,* is hardly visible to the naked eye. But the f the Gipsy Moth float, in consequence of eing covered with down.

* Braham, 249. Rosel. iv. 130.

CHAPTER II.

OF THE LARVA, OR CATERPILLAR STATE.

THE second, or larva state, is that condition of the animal which follows its exclusion from the egg. The Caterpillar is soft, without wings, and usually of an oblong shape, differing, however, very considerably in the various species. The lower figure of Plate I. represents the larva of the Peacock Butterfly, (*Papilio Io.*)

The word *larva* (which, in Latin, signifies a mask,) was adopted by Linnæus, because he considered that the real insect, while in the caterpillar state, was under a mask. In the English language caterpillar is the term employed for the grub of the butterfly in this condition.

The larvæ of butterflies are extremely small at first, when they issue from the egg, but they grow rapidly, and to a great size in proportion to their original bulk. The larva of the Goat Moth, (*Cossus ligniperda,*) when it has arrived at its full size, is *seventy-two* thousand times heavier than when it *emerges from* the egg; and the maggot of the Blue *Fly is, in* twenty-four hours, one hundred and fifty-*five times* heavier than at its birth.

Caterpillars have sixteen legs, and devour their
d by means of two jaws; they have twelve eyes,
exceedingly minute, as to be nearly imperceptible
without the aid of a microscope.

The quantity of food which is daily eaten by a
erpillar is surprising, being greatly more in proportion to its bulk than is consumed by any other
mal. Many larvæ eat twice their own weight of
ves within twenty-four hours. John Hunter assigned as a cause, that their stomachs have not the
wer of dissolving vegetable matters, but merely
faculty of extracting a juice from them.* This
ms indisputable from the fæces, consisting of coiled
hardened particles of leaves, which, after being
mersed in water, will expand like tea leaves. The
antity, also, in proportion to the mass consumed,
arther confirmation of the fact. Colonel Marshall
de some detailed experiments, and found that
larva of the *Bombyx Caja*, which weighed thirty-
grains, voided every twelve hours from fifteen
eighteen grains weight of excrement; while it only
reased in weight during that time from one to two
ins. While in this condition they generally eat
raciously, and repose but for short intervals. As
y enlarge, which they do very rapidly, they cast
eir skins several times. When the larva has at-
ned *its full size, it* soon afterwards ceases to eat,
mes excessively restless, and searches for a place,

* *Observations on the Animal Economy*, p. 221.

fitted to its nature, to which it may retire for the purpose of being transformed from one state of existence to another. It spins some silky filaments, generally attached to the under side of flowers, the crevice of a wall, or such safe retreat; and again its skin separates from the body, exhibiting the animal in its third condition. This Linnæus called the pupa.

When we know the astonishing numbers of eggs produced by various species of lepidopterous insects, we may wonder what becomes of them, for we see few, comparatively, of the perfect insects to these eggs, or even to the caterpillars of some species we meet with. The Creator of all things has, in his wisdom, checked the progress of these destructive larvæ, by forming a genus of insects to prey upon them, diminutive in their size when compared to the caterpillars. These are termed Ichneumons by Linnæus, and Microgaster by the celebrated French entomologist Latreille. Professor Rennie, in treating of these little *destructors*, says, "It must have occurred to the least attentive observer of the Cabbage Butterfly, (*Pontia brassicæ,*) that when it ceases to feed, and leaves its natural cabbage to creep up walls and palings, it is often transformed into a group of little balls of silk, of a fine texture, and a beautiful canary yellow colour; from each of which there issues, in process of time, a small four-winged fly, (*Microgaster glomoratus spinola,*) of a *black colour,* except the legs, which are yellow. By

eding these flies in a state of confinement, and roducing to them some Cabbage Caterpillars, ir proceedings in depositing their eggs may be erved. We have more than once seen one of se little flies select a Caterpillar, and perch upon back, holding her ovipositor ready brandished to nge between the rings, which she seems to prefer. hen she has thus begun laying her eggs, she does t readily take alarm; but, as Reaumur justly narks, will permit an observer to approach her th a magnifying glass of a very short focus. ving deposited one egg, she withdraws her ovi- itor, and again plunges it, with another egg, into lifferent part of the body of the caterpillar, till has laid in all about thirty eggs. It is not a le remarkable, that the poor caterpillar, whose ly is thus pierced with so many wounds, seems to ar it very patiently, and does not turn upon the , as he would be certain to do upon another erpillar, should it venture to pinch him, a cir- mstance by no means unusual. Sometimes, indeed, gives a slight jerk; but the fly does not appear be at all incommoded by the intimation that her sence is disagreeable.

" The eggs, it may be remarked, are thrust suffi- ntly deep to prevent their being thrown off when caterpillar changes its skin; and being in due ne hatched, the grubs feed in concert on the living *ly of the caterpillar.* The most wonderful cir-

cumstance, indeed, of the whole phenomenon, is the instinct with which the grubs are evidently guided to avoid devouring any vital part, so that they may not kill the caterpillar, as in that case it would be useless to them for food. When full grown, they even eat their way through the skin of the caterpillar without killing it, though it generally dies in a few days, without moving far from the place where the grubs have spun their group of silken cocoons in which to pass the winter." *

THE EGGS AND THE LARVA OF THE MICROGASTER GLOMORATUS.

Fig. 3. the eggs, natural size; Fig. 1. larva, natural size; Fig. 2. the larva magnified.



THE PUPA OF THE MICROGASTER GLOMORATUS.

Fig. 1. size of life; Fig. 2. magnified.



* *Insect Transformations*, p. 61.

THE MICROGASTER GLOMORATUS.
Size of life.



cocoon in which the pupa of these little
ls are destined to remain for a time, is fur-
with a distinct lid. This moves on a sort of
which the perfect insect has the power of
open, to escape from its confinement, after it
sformed from the pupa envelope.

COON OF THE MICROGASTER GLOMORATUS.
Fig. 1. natural size; Fig. 2. magnified.



ides the larva of the Cabbage Butterfly, many
are liable to be preyed upon by parasites,
r to the *Microgaster glomoratus*. The col-
of lepidopterous insects are often greatly
ointed in consequence; for, when they have
ed the caterpillars of some fine butterflies,
, or sphinges, which they have fed with care,
en transformed into chrysalides, from which
pect Butterflies to emerge in the most per-
dition, they find in their stead a numerous
these minute insects.

The Rev. Mr Bree says, "I once fed in confinement a caterpillar of the Large Egger Moth, (*Lasiocampa Quercus* of Stephens,) which, after having spun its cocoon, and changed to a pupa, in due time produced a host of small Ichneumons, with long ovipositors, somewhat resembling the *Ichneumon manifestator* in miniature." *

The early entomologists of this, as well as of other countries, were greatly puzzled to account for the generation of these minute parasites. Joannes Goedart, in allusion to the *Microgaster glomoratus*, and another species, speaks of them as being "wonderful things, nay, scarcely credible or before heard of;" and, in reference to the second, he says, "These things I have myself found by experience, and observed not without astonishment; because it seems beside, nay, contrary to, the usual course of Nature, that, from one and the same animal, an offspring of a different species should be generated; and that one and the same creature should procreate in three different ways, which yet is manifestly the case with these caterpillars, from what I have briefly related."† Goedart alludes to the two species of Ichneumon and the Cabbage Butterfly, being all produced, as he supposed, from the pupæ of these insects.

* *Loudon's Magazine of Nat. Hist.* v. p. 106. For an *interesting* account of these parasite insects, see Insect Transformations, p. 55, 58.

† Goedartii, *Metamorphoses* Exper. xl.

CHAPTER III.

OF THE PUPA, OR CHRYSALIS STATE.

ROM the resemblance of the animal in this con-
n to a mummy, or a child swathed in close
ses, which is a practice of many of the northern
ons, particularly the Laplanders, Linnæus gave
chrysalis the name of *Pupa*.

THE PUPA OF THE PEACOCK BUTTERFLY.

Plate 1.—Upper Figure.

THER terms used for this state are the *Chrysalis*,
the *Aurelia*; the former from a Greek word,
the latter from a Latin word. Various species
pidopterous insects, previous to this condition,
for themselves a casement of silky filaments,
naturalists term the *Cocoon*. In this en-
they lie concealed, until their final change.

After remaining for some months in the pupa condition, the skin or casement bursts, and the creature then emerges in its perfect or *Imago* state. This term was employed by Linnæus, from its having laid aside its mask, or swaddling clothes, and become a true image of its species.

Butterflies, in their perfect form, have only six feet, ten of those with which it was furnished in its caterpillar state having disappeared. The jaws, also, are lost, and replaced by a curled-up proboscis, incapable of mastication, and only suited for extracting the liquid sweets from flowers. The head is totally changed in form; and it has acquired four wings, to enable it to make rapid and extensive aërial flights. Two long horns project from the upper part of its head, and its twelve eyes are replaced by two, which are composed of at least twenty thousand convex lenses, each supposed to possess distinct and effective vision.

The internal change of structure is no less astonishing than that which is presented externally. In the caterpillar, there are some thousands of muscles, which are replaced in the *Imago* by others of a form and structure entirely different. Almost the whole body of the caterpillar is occupied by a capacious *stomach.* In the butterfly, this changes into an *almost imperceptible* thread-like process; and the *abdomen is inflated* by two large packets of eggs, or *other organs,* which are not visible in its former con

n. The caterpillar has two spirally convoluted
s filled with a silky gum, but in the butterfly
these have nearly disappeared; and equally
lerful changes have taken place in the struc-
and dispositions of the nerves and other organic
esses.

ich are the extraordinary metamorphoses to
h this animal is subject. It will be observed,
the change from the one form to the other was
direct, and that a distinct, and not less singular
intervened. After casting its skin several times,
even parting with its jaws, and at length, pro-
sing in bulk, and attaining its full growth, the
rpillar attaches itself to a leaf by a silken fila-
t. In this condition its body becomes much
racted; its skin splits once more, and discloses
iform mass, without exterior eyes, mouth, or
s, and exhibiting no appearance of life except
n touched, in which case it gives indications of
tence by a slight motion. In this deathlike
ment, in a state of torpor, it remains for months
out food. The casement at length bursts, and
ough not longer than an inch, and in dia-
er a quarter of an inch, a butterfly springs into
tence of dimensions extraordinary, covering a
ace of nearly four inches square.

utterflies and moths, while in the pupa state,
nclosed in a membranous skin, with their legs
use, and wings, closely folded over their bres

and sides. The whole body is enclosed in an external case or covering, of a horny consistence, which prevents the organs beneath from being so distinctly seen through, as may be observed in many other species of insects. These pupæ are often tinged with gold: hence the Roman name *aurelia*, and the Greek term *chrysalides*. These terms have now been converted into English words, and, more general in their application, signify all pupæ, whether gilded or not.

For general convenience, chrysalises may be divided into two great classes; namely, those devoid of angular projections, and those having such projections. Each of these present a variety of forms, and possess peculiar characters.

The first, or *angular* pupæ, are confined to Butterflies; in some of which the head projects into one short conical protuberance, as in the chrysalis of the common Cabbage Butterfly, and those species to which it is allied; others project into a horn; in a third, the head is armed with conical eminences; some few have nose-shaped prominences.

The second, or *conical*, include the nocturnal lepidoptera, such as Moths, &c. They are without protuberances, and subject to less variety of form. Exceptions, however, present themselves in the *Goat Moth*, and Orange-tip Butterfly: the former *having two points* on the head, while the latter is *distinguished* by a fusiform process from the head *and tail.*

CHAPTER IV.

OF THE SENSES OF LEPIDOPTEROUS INSECTS.

E order *lepidoptera* includes Butterflies, Sphinges, l Moths. The name of this order was given by næus from the mealy scales with which the wings covered.

There is much difficulty in determining the different ans by which the senses of insects are manifested. is arises from the great physical differences which st between vertebral warm-blooded animals, and se lower orders of creation without bones, and ving cold blood; so that little can be drawn from alogy. The subject, therefore, is still in much curity, notwithstanding the patient investigations Fabricius, Müller, Wollaston, Kirby, Spence, and nnie.

OF TOUCH.

Most naturalists are now of opinion, that the organs *uch, in insects* in general, are the antennæ and *, or what have* usually been called the feeler

Cuvier and Dumeril think that the palpi of insects are the organs of touch. While in search of food, these are used to try every object which they meet with. When walking, they are used to feel the ground; while they answer the purpose of hands in the scorpion tribe, and sometimes as feet by the spiders. Professor Rennie is of opinion, that an important organ of touch in insects, which has been altogether overlooked by naturalists, is the surface of the wings, being minutely furnished with nerves, which appear to him expressly formed for that purpose.* He says, —"It must be this, indeed, which in a great measure serves to direct their flight, as the focus of the eyes appears, according to our ideas of senses, to be too short for the purpose." The impulses of the atmosphere on the delicate and sensitive organs, may, in a great measure, assist, but certainly the eyes are the organs by which they direct their course.

In illustration of this doctrine, the Professor observes,—"We remarked, for several weeks, near St Adresse, in Normandy, a very limited spot, close by the sea, to be daily frequented by about half a dozen of the Clouded Yellow Butterfly, (*Colias Edusa*, Stephens,) which seemed to make a regular circuit, and return again, altogether independent of the direction of the wind, against which they often *made way*. Now, as they rose to so considerable a *height, that* they must have lost sight of the ground,

* *Insect Miscellanies*, p. 12.

we conclude, that they guided their flight more by the weight of the superincumbent air, than by the direction of the wind,—an inference rendered more probable, by their never being seen on the heights, which there rise steeply from the shore." *

We are well aware, that the wings of bats are analogous to the human hand, but possess a degree of feeling much more exquisite than that organ in man. For it is certainly by the nervous sensibility of their wings that they are enabled to avoid flying against walls, trees, and other objects, in the dark. Moths possess this faculty, but in a degree not so perfect as bats. It is a well known fact, that all insects are extremely sensible of any atmospheric change, and that when it is in an electrified state, they retire to some sequestered retreat. This is especially the practice with butterflies, moths, and sphinges.

"The excellence of the sense of touch in many insects," says Dr Darwin, "seems to have given them wonderful ingenuity, so as to equal or even excel mankind in some of their arts and discoveries." He has beautifully illustrated this in his *Temple of Nature.*

The wasp, fine architect, surrounds his domes
With paper foliage, and suspends his combs;
Secured from frost, the bee industrious dwells,
And fills for winter all her waxen cells;

* *Insect Miscellanies*, p. 12.

The limning spider, with adhesive line,
Weaves his firm net immeasurably fine;
The wren, when embryon eggs her cares engross,
Seeks the soft down, and lines the cradling moss;
Conscious of change, the silkworm nymphs begin,
Attach'd to leaves, their gluten-threads to spin,
Then, round and round they weave their circling heads,
Sphere within sphere, and form their silken beds.—
Say, did these fine volutions first commence
From clear ideas of the tangent sense?
From sires to sons by imitation caught,
Or in dumb language by tradition taught?
Or did they rise in some primeval site
Of larva-gnat, or microscopic mite;
And, with instinctive foresight, still await
On each vicissitude of insect state?—
Wise to the present, nor to future blind,
They link the reasoning reptile to mankind!—
Stoop, selfish Pride! survey thy kindred forms—
Thy brother emmets and thy sister worms! *

OF TASTE.

As in the sense of touch, analogy leaves us no grounds for supporting the doctrine of taste in insects; for if the physiological distinctions in the higher animals were held up as tests, then it might be inferred, *a priori*, that insects had no taste; for in place of the organs being soft, moist, and furnished with innumerable papillæ, their tongues are rigid, dry, and hard. There, however, can be but little doubt that they do enjoy this sense in a considerable degree,

* DARWIN'S *Temple of Nature*, p. 110.

from the fact that they are very particular in the choice of their food; and most of the butterfly tribe, while in their various conditions, will feed only on the plant on which they were brought into existence, or when in a perfect state, on the nectar of flowers.

Last autumn, a box and several flowerpots, with mignionette, was covered with numerous caterpillars of the *Papilio rhamni*. I took many of these off, and put them into a tumbler, to feed and watch their progress as to growth and time of transformation. Wishing to ascertain whether or not they would feed on any other plants than that on which they had been hatched, I allowed them to consume all the leaves, and when I supposed them very hungry, supplied them abundantly with lettuce, sour dock, and other vegetables; but they refused them all, preferring to gnaw and totally consume the epidermis of the dry stalks, rather than take the proffered food, which, it would appear, was not their native aliment, and they would have died rather than taste any other. The moment that leaves of mignionette were introduced, they speedily found them out, and greedily devoured them.

De Geer remarked the same thing; for he found that the larva of a Papilio, which inhabited both the sallow and poplar, would feed only on the trees on which they were hatched; for those produced on the sallow would rather die than eat the poplar,

while those propagated on the poplar would not eat the leaves of the sallow.

It is well known that the Antler Moth,* which devours a considerable variety of grasses, and that to such an extent as almost totally to consume some of the richest pastures of Sweden, is nevertheless so fastidious in its taste, as to reject most scrupulously the fox-tail grass, which in flavour so nearly resembles other grasses on which it feeds, that the most sensitive palate of man is incapable of distinguishing the difference. The larva of the Ringlet Butterfly† will only feed on the poa;‡ and the Gate-keeper§ abstains from all other food but the dog's-tail grass.‖

If we judge from circumstances, the taste in bees does not seem very perfect; "for," says the elder Huber, "contrary to the received opinion, they display little choice in collecting honey; nor do they testify greater nicety in the quality of the water which they drink, as the most corrupted marshes and ditches seem to be preferred to the most limpid streams, nay, even to dew itself. Nothing, therefore, is more unequal than the quality of honey, the produce of one district differing from another, and the honey of spring being unlike that of autumn."

* *Charæas Graminis* of Stephens.
† *Hipparchia Hyperanthus* of Fabricius.
‡ *Poa annua.*
§ *Hipparchia pamphilus.*
‖ *Cynocerus cristatus.*

lthough insects appear to have dry, rigid mouths, they possess the salivary glands, which are ne- ıry for moistening their food, and fitting it for tication. Professor Rennie has recently made e conclusive experiments on this interesting sub-

He says, " one of the circumstances that first kened our curiosity with regard to insects, was manner in which a fly contrives to suck up, ugh its narrow sucker, (or *haustellum,*) a bit of lump sugar; for the small crystals are not only tted to pass, from their angularity, but adhere firmly together to be separated by any force the ct can exert. Eager to solve the difficulty—for e could be no doubt of the fly's sucking the dry ır—we watched its proceedings with no little ntion; but it was not till we fell upon the de- : of placing some sugar on the outside of a win- r, while we looked through a magnifying glass the inside, that we had the satisfaction of re- tedly witnessing a fly let fall a drop of fluid upon sugar, in order to melt it, and thereby render it o be sucked up,—on precisely the same principle t we moisten with saliva, in the process of mas- tion, a mouthful of dry bread, to fit it for being llowed,—the action of the jaws, by a beautiful trivance of Providence, pressing the moisture ng the channels at the time it is most wanted." To the investigations of Swammerdam, we are *bted for our first* knowledge of these vessels.

He observed them in the small Nettle Tortoise-shell Butterfly; but he was unable to trace their termination; and cautiously observes, "What the office of these vessels is, and whether they may not be salivary ducts, I cannot take upon me to determine."* That naturalist, as well as Ramdohr, was inclined to suppose these the silk reservoirs; but that they were not was proved by Lyonnet, who detected a conspicuous pair of salivary ducts in the larva of the Goat Moth;† and in his investigations, he is borne out by the dissections which were afterwards made by Heroldt, in his minute and satisfactory anatomy of the Cabbage Butterfly.

Butterflies, in their mature state, have but little fluid matter in them; and, besides, being so much exposed to the scorching rays of the sun, in which they are continually sporting, are liable to great thirst. They are often, therefore, to be seen in the act of drinking by the sides of pools of water; particularly in the sultry autumnal months. Mr Rennie says, "At Compton Basset, in Wiltshire, I once counted about fifty of the small White Butterfly (*Pontia Rapæ*, of Haworth) all assembled within a space of a few yards on the sludge which had just been left by the water of a pond, partially dried up by the sun. What was most remarkable, they

* *Book of Nature*, Part ii. p. 21.
† *Traité Anatomique*, p. 112.

seemed to have quite lost the pugnacious disposition which they were affirmed to display when they meet with their congeners on the wing. At the pond, on the contrary, all was harmony among these light winged belligerents, no one disturbing its neighbour, though they stood side by side, and almost touching one another. They were, indeed, too intent on quenching their thirst to think of attack or defence. We remarked, in the autumn of 1829, a similar congregation of the same species of butterfly on the watered roads in the vicinity of London. They do not seem to be more choice in the quality of their water than bees, who, most naturalists tell us, prefer that which is stagnant and putrescent."*

It is remarkable that some insects feed upon substances which are poisonous to other animals; for example, the caterpillar of the *Papilio cupido* feeds on the leaves of tobacco, which proves a deadly poison to most of the mammiferous animals, and is even destructive to many of the insect tribes.

OF SMELL.

THERE can be little doubt that the sense of smell is enjoyed by most insects in a high degree of perfection. Mr Rennie remarked, that, in a narrow garden, enclosed with stone walls, about fifteen feet high, at Havre de Grace, every butterfly which

† REAUMUR, v. p. 697.

passed over it was sure to visit the blossoms of an Alpine blue nettle, (the *Centaurea montanea.*) This is the more remarkable, as that flower is known to have but little effect on the olfactory nerves of the human species. Now, these butterflies were alive to its odour at upwards of twenty feet. This fact is the more striking, as the odours of flowers are said by M. Le Chat to be much heavier than atmospheric air, and therefore but seldom rise in it. We have ascertained this to be true, from the circumstance, that mignionette, although possessing a powerful odour, and planted close to a building, can be but faintly, if at all, perceived from a window one story high; although, on going to the surface of the earth, we find the atmosphere surcharged with its fragrance at the distance even of from fifty to an hundred yards. Mr Rennie remarked that even the Painted Lady Butterfly, (*Cynthia cardui,*) which always flies at a considerable height, alighted on the plants above mentioned, thus proving that their perception of odours is very acute.

It is a practice with collectors to entrap the large Tortoise-shell Butterfly, (*Vanessa polychlorus,*) by spreading honey on the leaves of a tree which they are in the habit of frequenting.

There is great difficulty in determining by what means the organ of smell in insects manifests itself; *for, as they* do not breathe like quadrupeds, or other *warm-blooded* animals, by the mouth, but by an in-

numerable number of spiracles along each side of their bodies, where then can this organ be situated? The theory of smell in the higher animals is, that it is felt by a current of air which is impregnated with odoriferous particles passing through a moistened channel. This was first most ably described by Schneider, nearly two centuries ago.* Reasoning from analogy, we would say that insects enjoy this sense by the same process. Hence Baster, Cuvier, Dumeril, and Lehmann, are of opinion, that insects perceive odours by means of their breathing holes.

Blainville says the antennæ are the organs of smell. He is of opinion that the modification of the skin with which they are invested, is in general olfactory only in a small degree; this power appearing to be more acute in the thickest parts of the organs, where it is more soft and tender. A difficulty to the establishment of this theory is, that spiders have no antennæ, consequently do not possess this sense, if his doctrine were true. Latreille entertains the same opinion; "for," says he, "the exercise of smell consists only of the action of the air impregnated with odoriferous particles on the nervous, or olfactory membrane, which transmits the sensation. If insects are really endowed with an organ furnished with similar nerves, and with which air, charged with odoriferous particles, comes in contact, such an

* *De Sensu ac Organo Odoratus*. Witteb. 1655.

organ may be regarded as that of smell. Should, therefore, the antennæ present a tissue of many nerves, what inconvenience can take place from supposing this tissue the medium of transmitting odours? Would not this hypothesis, on the contrary, be more simple and more consonant to anatomical principles, than that which fixes the seat of smell at the entrance of the stigmata?"

Mr Kirby, however, mentions one observation he made in his description of the Long-horned Bee, (*Eucera.*) "A singular circumstance distinguishes their antennæ, which, to the best of my knowledge, has never been before noticed, and which may possibly lead to the discovery of the use of these organs. Placed under a powerful magnifier, the last ten joints appear to be composed of innumerable hexagons, similar to those of which the eyes of insects consist." Mr Rennie, in alluding to this fact, says, "If we reason from analogy, this remarkable circumstance will lead us to conjecture, that the sense, of which this part so essential to insects is the organ, may bear some relation to that conveyed by the eyes. As they are furnished with no instrument for preserving and communicating the impressions of sound similar to the ear, that deficiency may be supplied by extraordinary means of vision. That the stemmata are of this description seems very probable; *and the* antennæ may, in some degree, answer a *similar purpose*: the circumstance just mentioned

furnishes some presumption that they do this, at least, in the case of the males; else why do they exhibit that peculiar structure which distinguishes the real eyes?"*

Huber's experiments seem to go far to establish a different theory. He says, "Let us now inquire into the state or organ of this sense, whose existence has been so well established.

"Nostrils have not yet been recognised in insects; nor do we know in what part of the body they, or any other organs corresponding to them, are placed. Probably odours reach the sensorium through the medium of a mechanism similar to our own,—that is, the air is introduced into some opening at the termination of the olfactory nerves; and hence we should examine if the stigmata† do not perform this function, or whether the organ we are in quest of be not situated in the head, or in some other part of the body. With the view of elucidating the matter, we made the following experiments:—

"1. A pencil dipped in oil of turpentine—one of the substances most disliked by insects—was presented successively to all parts of the body of a bee, which did not appear in the least affected, whether

* *Insect Miscellany*, p. 63.

† Certain apertures, generally called stigmata, appear on each *side of the body of* insects, which naturalists believe to *be appropriated exclusively* to respiration.

on approaching the thorax, abdomen, or stigmata of the thorax. 2. We then took a fine pencil, that it might reach every point of the head, and brought it near the antennæ, the eyes, and protruded trunk of a bee in the act of feeding, but without producing the least effect. It was otherwise on carrying it near the cavity of the mouth, above the insertion of the proboscis. At that instant the bee receded, left the honey, and, beating its wings, while moving about in much agitation, it would have taken flight had not the pencil been withdrawn. Having renewed its repast, we resumed the application, always carrying the impregnated portion near the mouth. The bee, now quitting the honey, fixed upon the table, and fanned itself during some minutes. The organ of smelling, therefore, seems to reside in the mouth itself, or in the parts contiguous.

"Bees not occupied in feeding appeared more sensible of the odour of the turpentine. They were affected by it at a greater distance, and speedily took flight, whereas, when so engaged with the trunk immersed in honey, several parts of the body might be touched by the pencil without their withdrawing. We inferred that their attention was either absorbed by the smell of the honey, or their organs less exposed to the effluvia. This could be ascertained in two ways,—either by covering all parts of the body with a varnish, and leaving the sensible organ free; or *allowing* the whole parts to remain untouched,

epting that in which the sense of smell was sup-
ed to reside.

" The latter method appearing the more practic-
e and decisive, we seized several bees, and, compel-
g them to unfold the trunk, filled the mouth nearly
th flour paste. When this was dry enough, so that
ey could not rub it off, they were released, and
ne seemed to suffer any inconvenience from it.
ey breathed and moved with the same facility as
eir companions. Honey, however, did not attract
em, as they neither approached it, nor were they
ected by odours which, in other cases, are offensive
them. Pencils were dipped in the oil of turpentine
d cloves, in ether, in fixed and volatile alkalis, and
eir points insinuated very near their mouth. But
e odour of these fluids, which would have occa-
ned a sudden shock to bees in their natural state,
d no sensible effect on them. On the contrary,
veral mounted on the impregnated pencils, and
nversed them with impunity: therefore, we held
at their sense of smelling was obstructed by the
ste put into their mouths." *

Humboldt is of opinion, that different parts of
e body, in the various orders of insects, are
apted to the purpose of conveying to their senso-
um the odours of substances.

* Huber *on Bees.* Edinburgh Translation, (Third Edi-
n,) *1821, p. 162—164.*

Kirby and Spence, following up the experiments of Huber, say that the olfactory sensation is conveyed by "the extremity of the nose, between it and the upper lip, or under those parts;" and that it is analogous to this sense in mammiferous animals; and conceive that no one can look on an insect without coming to this conclusion.* But as we are not furnished with any experiments by which we are to prove that insects breathe at all through their head, we are at a loss how to account for the conviction of these authors. And being still so imperfectly acquainted with this part of the insect economy, we must leave it to be decided by future investigations. If, however, the conclusions of Dr Rousseau be correct,—that without the sense of smelling, we could have no taste, then it appears pretty evident that there must be spiracles in the mouths of insects, by which smell is conveyed to the sensorium.

Rousseau made some experiments on the human species, by which, we think, he was fully warranted in adopting his theory. He successively blindfolded some young medical students, who were sceptical regarding his opinion, and after effectually stopping their nostrils, gave them onions to eat, which they took for apples, and they supposed camphor to be bread.

* KIRBY and SPENCE, *Introduction to Entomology*, iv. *p. 256.*

OF HEARING.

Naturalists are much divided in opinion regarding the organs of hearing in insects, and many maintain that they are insensible to sounds. The antennæ, by some, are supposed to correspond to the ears of other animals, but as yet no satisfactory proofs have been discovered to warrant this conclusion.

It is well known that insects emit various sounds; but whether these are heard by their congeners, is still matter of dispute. We can, however, conceive, that if these sounds are not heard, in the strict sense of the word, yet it is quite possible that they may be perceived by the impulses they produce on the atmosphere through the medium of the antennæ, or other organs, which may possess an exquisite sensibility in this respect.

After an attentive perusal of all which has been written on this subject, we are quite unable to venture even an opinion; and it would only be a waste of time to adduce all the arguments which have been held on both sides of the question.

OF VISION.

Much difference of opinion exists among naturalists, regarding the extent of vision in insects. In the instance of bees, Huber says,—"How great is the perfection of their organ of sight!—Since, from a *distance, the bee recognises* its habitation, amidst an

apiary of numerous others resembling it, and returns in a straight line with great velocity, we must suppose that it is distinguished by marks escaping our notice. The bee departs, and flies straight to the most flowery field. Having ascertained its course, it is seen traversing it directly, as the flight of a cannon or musket ball. Its collection being made, it rises aloft in the air, to reconnoitre its hive; and returns with the rapidity of lightning." *

On this subject, very opposite opinions prevail; for Wildman maintains, that he has observed bees searching for the door of their hive, and frequently been obliged to rise in the air again, in order to find it. This, according to the views of Dr Bevan, is, because they see objects at a distance better than those that are near, from the contraction of their eyes. The experiments of Dr Evans and Sir G. S. Mackenzie, both tend to support Wildman's views.

We are yet but imperfectly acquainted with the vision of insects; and, from the great variety in the construction of their eyes, it is no wonder we should be so. For example, a centipede has twenty eyes, a spider has eight, and a butterfly and its congeners but two; but these two have thirty-five thousand facets in each. It may, therefore, seem remarkable, how they see but one object; but it is not a more difficult question, than how we see but one object with two *eyes.*

* *Huber on Bees*, Edinburgh Edition, p. 255.

When the facetted eye of a butterfly is examined a little closely, it will be found to have the appearance of a multiplying glass, the sides, or facets, nearly resembling a brilliant cut diamond.

In the experiments performed by Mr Herschel, he describes the impulses received by the eyes of insects as analogous to those of sound, as given by Wollaston. He says,—"Although any kind of impulse or motions, regulated by any law, may be transferred from a molecule in an elastic medium; yet in the undulating theory of light, it is supposed that only such primary impulses as occur according to regular periodical laws, at equal intervals of time, and repeated many times in succession, can affect our organs with the sensation of light. To put in motion the molecules of the nerves of our retina with sufficient efficacy, it is necessary that the almost infinitely minute impulse of the adjacent etherial molecules should be often and regularly repeated, so as to multiply, and, as it were, concentrate their effect. Thus, as a great pendulum may be set in swing by a very minute force often applied, at intervals exactly equal to its time of oscillation; or, as one elastic solid body can be set in vibration, by the vibration of another at a distance, propagated through the air, if in exact unison; even so may we conceive the gross fibres of the nerves of the retina to be thrown into motion, by the continual repetition of the etherial *pulses; and such only* will be thus agitated, as from

their size, shape, or elasticity, are susceptible of vibrating in times exactly equal to those at which the impulses are repeated. Thus, it is easy to conceive how the limits of visible colour may be established; for, if there be no nervous fibres in unison with vibrations, more or less frequent than certain limits, such vibrations, though they reach the retina, will produce no sensation. Thus, too, a single impulse, or an irregularly repeated one, produces no light; and thus, also, may the vibrations excited in the retina continue a sensible time after the exciting cause has ceased, prolonging the sensation of light, (especially of a vivid one,) for an instant in the eye. We may thus conceive the possibility of other animals, such as insects, incapable of being affected with any of our colours, and, receiving their whole stock of luminous impressions from a class of vibrations altogether beyond our limits, as Dr Wollaston has ingeniously imagined, (we may almost say, proved,) to be the case with the perceptions of sound." *

PAIRING OF LEPIDOPTEROUS INSECTS.

In almost all insects, there is great variety in the colour of the males and females; and in many they are so different in form, as to be taken for different species.

In butterflies, the males are usually of a brighter

* *Encyclopædia Metropolitana*, Article Light.

colour than the females, and, not unfrequently, of totally different colours. Want of experience in this department, led the great Linnæus into an egregious blunder; for he considered them not only specifically distinct, but also as belonging to different families. His divisions of Trojans and Grecians is, in many instances, liable to this objection. The male Brimstone Butterfly, (*Gonepteryx Rhamni,*) is of a beautiful sulphur yellow; while the female is of a dirty greenish white. In the Orange-tip Butterfly, (*Pontia cardamines,*) so named from the fine orange spot towards the points of its superior wings, the spot is possessed by the male only. The male Argus Butterfly, (*Polyommatus argus,*) has the upper surface of the superior wings of a dark mazareen blue; while those of the female are of a deep brownish purple.

The female butterflies are less frequently to be seen than the males, as they conceal themselves in some quiet retreat. In these situations, they are supposed to be discovered by the sense of smell in the males, which can be accomplished at a great distance. This has long been known to British entomologists. For we find, by the writings of Barbut and Moses Harris, that they were aware of this fact, and practised a mode of catching the males, which they termed *sembling,* from possessing a female of the species in confinement. Haworth says, "It is a *frequent practice with* the London Aurelians, when

they breed a female of the Lappit Moth, (*Gastropacha Quercifolia,*) and some other day flying species, to take her in a box with a gauze lid into the vicinity of the woods, where, if the weather be favourable, she never fails to attract a numerous train of males, whose only business appears to be an incessant, rapid, and undulating flight in search of the females. One of these is no sooner discovered, than they become so much enamoured of their fair kinswoman, as absolutely to lose all fear for their own personal safety, which, at other times, is effectually secured by the reiterated evolutions of their strong and rapid wings. So fearless, indeed, have I beheld them on these occasions, as to climb up and down the sides of the cage which contained the dear object of their eager pursuit, in exactly the same manner as Honey Bees which have lost themselves, climb up and down the glasses of a window."

After the butterflies, sphinges, and moths, have arrived at their perfect, or imago condition, their whole business seems to be the fulfilment of that universal law of nature, the reproduction of their kind. This is prettily told by Darwin, in the following lines:—

> Hence, when the morus,* in Italia's lands,
> To spring's warm leaves its timid leaf expands,
> The silkworm broods in countless tribes above
> Crop the green treasure, uninform'd of love;

* The mulberry-tree.

Erewhile the changeful worm, with circling head,
Weaves the nice curtains of his silken bed;
Web within web involves his larva form,
Alike secured from sunshine and from storm;
For twelve long days he dreams of blossom'd groves,
Untasted honey, and ideal loves,
Wakes from his trance, alarm'd with young desire,
Finds his new sex, and feels ecstatic fire;
From flower to flower, with honey'd lips he springs,
And seeks his velvet loves on silver wings.

Mr John Henry Davies, curator of the museum of he Portsmouth Philosophical Society, has recorded ome curious and satisfactory observations on the ubject.* He says,—"It has been asserted, that the nales of lepidopterous insects are guided to the emales by a peculiar instinct; so that an unimpregnated female, being carried in a wire cage along the edges and other haunts of this tribe, will attract the nales of that species, so that they may be easily aptured.

"I have never had an opportunity of trying this xperiment; but the following fact, which has lately allen under my observation, leaves me no room to loubt the correctness of the assertion, as it proves he existence, and exhibits the operation of this nstinct in a very remarkable manner.

"Being engaged in adding the British insects to

* *Zoological Journal*, vol. v. p. 142.

the collection of the Portsmouth Philosophical Society, I had procured a variety of larvæ, (the insects thus obtained being generally in a better condition than those taken by the net.) They in due time passed into the pupa; and the first which emerged, was a female *Sphinx Convolvuli*. On going into my study in the evening, I found it fluttering on the floor. On lifting it up, it ran up my coat, and several times round the collar, before I could place it in safety. I went from thence immediately into my garden, to shut some hot-bed lights, where I was occupied about ten minutes; from thence again to my study, where I found that two fine males of the *Sphinx Convolvuli* (Unicorn Hawk-moth) had, whilst in the garden, attached themselves to the collar of my coat, where the female had previously been.

"After this, another female of the same species had been produced; three males found their way into my study down the chimney, there being no other mode by which they could obtain entrance; and one of them fell into a vase standing under it, where he was captured. A few days after, two females of the *Phalæna salicis* (Satin Moths) emerged. On the same evening, I saw several of that species fluttering against the window; and, on opening it, six males rushed in, and instantly sought the females.

"I state these facts just as they occurred. They *are certainly* curious, and go to prove, that the *females emit* an odour perceptible to the delicate

olfactory organs of the males at a great distance, who, when attracted, are stimulated to overcome every obstacle in the way of the fulfilment of the great law of nature. After the female has become gratified, this effect appears to cease.

"Precisely similar circumstances took place with the *Phalæna neustria*, (Crimson and Gold Moth,) the males presenting themselves at the window."

Professor Rennie asserts that this does not always succeed; for, says he, "In the spring of 1830, we bred a female of the Lime-hawk Moth, (*Smerinthus Tiliæ* of Latreille,) and placed her on a small lime-tree, planted in a garden-pot, and left her at full liberty, trusting to the known stationary habits of female insects for not losing her. In this we were not deceived; for though the tree consisted only of a single stem, of about three feet high, she never left it, remaining upon the same leaf sometimes for several days without stirring; and when she did move, it was only to perambulate the plant, agitating her wings the while, (as she did while stationary,) with a sort of tremulous quivering, not very perceptible, unless closely inspected. It might be that there were no males in the vicinity, though the insect is by no means rare around Lee. At all events, she remained without a male for about three weeks, as the eggs, which she at length laid, proved to be infertile; and she died soon after. In the instance of a much rarer insect, the Clear Under Wing,

(*Ægeria Asiliformis* of Stephens,) having discovered a brood in the trunk of a poplar tree, we were desirous of securing all that issued from it; and having caught a female, we placed her in a box covered with gauze, at the root of the tree,—the notion of surrounding the tree itself with gauze, not having occurred to us at the moment. As this moth is one of the day fliers, we expected to make sure of all the males in the neighbourhood; but, to our no small disappointment, not one approached the box, though we afterwards enclosed in it another female. This was the more remarkable, that, from the protrusion of the pupa cases from the tree, there was evidently not only one or two, but a considerable number evolved, after the box had been placed there. In 1818, having discovered a beautiful male Crane Fly, (*Ctenophora pectinicornis* of Meiger,) apparently just disclosed from the pupa, we carefully examined the old willow stump upon which it rested, expecting to find more of the same brood. Next day, we accordingly observed a female, and imagining it to be one of the rare species, (*Ctenophora ornata*, or *flaveolata*,) we placed her in a gauze-covered box; but no male approached for five days, when a large hunting spider found means to introduce himself into the box, and made a meal of her.

"There is one extraordinary fact connected with *this subject*, which is worthy of being prominently *stated*, namely,—that after insects pair, and the

les deposit their eggs, they very soon die, seldom g a few days, sometimes only a few hours after- ls; but should pairing be prevented, their lives, particularly that of the female, may be pro- ed to an indefinite period. Collectors, indeed, it is with the utmost difficulty a female can be ived of her life before laying; and we have no t, that the marvellous stories reported of the al of flies and other insects, after long immer- in spirits, or after being crushed in shutting a , originated in this circumstance, as well as the nged life of some insects, which is given on good ority." *

is a most singular circumstance, in the case e quoted, that moths which have not met with te, should live so considerable a time beyond imits ordinarily prescribed by nature; and it d be difficult, on physiological principles, to ac- t for it. There are also some examples of but- es continuing their existence even for months, ay be instanced in the Peacock Butterfly, the le Tortoise-shell Butterfly, and several others, h are hatched late in the autumn, and live in pid state till the spring, when they meet with te. Had these been hatched earlier in the ner, and laid their eggs, they would have died, nost of their congeners.

* *Insect Miscellany*, p. 217.

CHAPTER V.

ASSOCIATIONS AND MIGRATIONS OF LEPIDOPTEROUS INSECTS.

In quadrupeds, birds, and fishes, there are instances of extraordinary periodical migrations, principally for the purpose of obtaining food in more abundance, when it becomes scarce, from the effects of climate or other circumstances. In insects, too, there are frequent extensive migrations, to account for which we find some difficulty. It is easy to see the reason why some species of caterpillars associate, as they, for their mutual protection, construct nests wherein to retire, both during night and in bad weather. The *Papilio Io* and *cinixia* are examples of this: the former constructs a nest like the Processionary Moth, although differing in some particulars.

Some insects associate only in their imago state; while others are gregarious in both conditions. Others, again, congregate while in their larvæ form; which, with a very few exceptions, is the case with *the numerous* tribe of lepidopterous insects. These *are hatched* together, and remain in compact, for

the purpose of rearing, by their united labour, a comfortable dwelling.

There have been instances of butterflies associating in large bodies: but for what purpose, no one has as yet been able to ascertain. We are informed by Mr Knapp, that on a calm summer day he observed a prodigious number of the *Papilio Brassicæ*, or Large Cabbage Butterfly, flying from north-east to south-east; and so immense were their numbers, that their flight was continuous for upwards of two hours.* And Kalm relates in his *Travels*,† that he noticed this remarkable flight nearly half across the British Channel. It is recorded by Lindley, in the *Royal Military Chronicle*, that in the beginning of March 1823, in Brasil, there were prodigious flights of white and yellow butterflies, which lasted for many days successively. They were not observed to settle any where, but proceeded on their course from north-east to south-east. So direct was their line of travel, that nothing stopped them; and their progress was towards the sea, which was not far off, where they, in all probability, would perish. It is curious, that, at the time this flight was observed, no other species could be seen; and this is the more remarkable, as the country abounds in a variety of these insects.

"An extraordinary flight," says Captain Adams, "of small butterflies, with spotted wings, took place

* Rosel's *Amusements of Insects*, ii. 135.

† *Kalm's Travels*, p. 13.

at Annamaboo, on the Guinea Coast, after a tornado. The wind veered to the northward, and blew fresh from the land, with thick mist, which brought off from the shore so many of these insects, that for one hour the atmosphere was so filled with them, as to represent a snow storm driving past the vessel at a rapid rate, which was lying at anchor about two miles from the shore."

In the *Journal de Rouen*, we are informed that several persons testified, they had witnessed, at Sotteville-les-Rouen, a rain of white butterflies, which fell in abundance towards the close of the day. This, no doubt, proceeded from one of these flights, and the insects, in all probability, becoming paralyzed, from mounting too high in the atmosphere.

An extensive migration, but somewhat different, was noticed in one of the Cantons of Switzerland. Madame de Meuran Wolff, and her family, who were residing at Grandson, on the Lake of Neufchatel, one day noticed, in the garden, an immense flight of butterflies, of the species called Painted Lady, proceeding with great rapidity. They flew close together, in the same direction, from south to north: and, although repeatedly approached, they exhibited no signs of fear, nor were they diverted from their straightforward course. This extraordinary flight consisted of a column of from ten to fifteen feet in *breadth*, and continued, without interruption, for *upwards* of two hours. Although the garden was

plentifully supplied, at the time, with melliferous flowers, not a single butterfly was seen to alight, but all continued to pursue their course, in a low and equal manner. What renders this fact the more singular is, that from the moment the caterpillars of this species are hatched, they lead a solitary life; and even in their perfect, or imago condition, they are not observed to be gregarious.

Professor Bonelli of Turin, however, observed a similar flight of the same species of butterflies, in the end of the March preceding their appearance at Grandson. Their flight was directed from south to north; and their numbers were immense. At night, the flowers were literally covered with them. Towards the 29th of March, their numbers diminished: but even in June a few still continued. They have been traced from Coni, Raconni, Lusa, &c. A similar flight of butterflies is recorded at the end of last century by M. Louch, in the *Memoirs of the Academy of Turin*. During the whole season, these butterflies, as well as their larvæ, were very abundant, and more beautiful then usual.

Among the larvæ of butterflies which associate, may be particularly mentioned that of the *Papilio cinixia*. This animal may be found on the leaves of the narrow-leaved plantain, on which it feeds. They usually associate in families, amounting to about one hundred in each. By their united labour, they weave a silken tent of a pyramidal form. This contains a

variety of apartments, is always pitched over the plants on which they feed, and answers the double purpose of sheltering them from the heat of the sun, and from heavy showers of rain, neither of which is at all agreeable to their tender frames. After they have devoured all the leaves within the verge of their covering, they set to work, and construct a new one over some other roots of the same plant; and it not unfrequently happens, that several of these encampments are within a few feet of each other. On the approach of winter, they construct a stronger tent, consisting of one apartment. When the cold weather sets in, they retire within it, roll themselves up into a sort of ball, and lie huddled together until April, when they break up their community, become solitary, and continue so, till they assume the pupa condition.

Where food is abundant, there have been many instances of papilionaceous insects performing wonderful migrations; while others limit their excursions to a very narrow range. The Forester, (*Ino Statices* of Leach,) has been observed in vast numbers disporting on the north bank of the Serpentine, in Kensington Gardens, while not a single one was to be seen on the opposite bank, nor even in any other spot in the neighbourhood. Professor Rennie, on one occasion, observed many hundreds of the Burnet Moth, (*Anthrocera filipendulæ* of Stephens,) on the north shore of the Great Cumbrya Island, at the mouth of the Clyde, but not on any other part of the

island, nor on the opposite shore at Largs, although he made a round of the island on the same day. He also visited the Isle of Bute; but did not meet with a single specimen.

Harris says, that the Marsh Fritillary (the *Melitæ artemis* of Ochsenheimer) is so extremely local in its habits, that it seldom leaves the field on which it is bred, although hundreds of them may be seen flying low, and frequently alighting on plants. This insect was only found by him at Wilsden, near Harrow-on-the-Hill; but recent collectors have been unable to detect it there.

These local associations seem rather to be unusual to the general law which regulates the motions of lepidopterous insects; for almost the whole tribe, particularly the papilionaceous genera, seem to rove from field to field, without any fixed plan or motive.

As their wings are usually so ample, we need not wonder that the lepidopterous insects are such excellent fliers. Indeed, they seem to flit untired from flower to flower, and from field to field; impelled at one time by hunger, and another by love or maternal solicitude. The distance to which some males will fly, is truly astonishing. One of the Silkworm Moths (*Bombyx paphia* of Fabricius) is stated to travel sometimes more than a hundred miles in this way.*

The most beautiful of all the British butterflies,

* *Linnæn Transactions*, vol. vii. p. 40.

the Purple Emperor, (*Papilio iris* of Linnæus,) when he makes his first appearance, fixes his throne on the summit of some lofty oak, from whence, in sunny days, unattended by his empress, who does not fly, he takes his excursions. Lanching into the air, from one of the highest twigs, he mounts often to so great a height, as to become invisible. Hence his synonymous name of the Purple Highflier. When the sun is at the meridian, his loftiest flights take place; and, about four in the afternoon, he resumes his station of repose.*

The large bodies of the Hawk Moths (*Sphinx*) are carried by wings remarkably strong, both as to nerves and texture, and their flight is proportionally rapid and direct. That of butterflies is by dipping and rising alternately, so as to form a zigzag line, with vertical angles, which the animal often describes with a skipping motion, so that each zigzag consists of smaller ones. This, doubtless, renders it more difficult for the birds to take them as they fly; and thus the male, when paired, often flits away with the female.†

* Haworth's *Lepidoptera Britannica*, i. p. 19.

† Kirby and Spence, ii. p. 355.

CHAPTER VI.

INDIRECT INJURIES TO MANKIND FROM BUTTERFLIES.

It has been the will of Providence to place around man, in this sublunary world, many animals, which we shortsighted mortals cannot suppose to have been formed for his good. Among these is a host of insects, which lay waste the most valuable of our culinary vegetables, and others direct their ravages to the fairest and most delightful of our flowers.

In dry summers, the caterpillar of the common Cabbage Butterfly often proves destructive to whole gardens, consuming every thing which is green; to prevent which, no effectual means have been devised. They feed indiscriminately on the leaves of turnips, cabbages, greens, and other plants. What vegetable can be more agreeable and wholesome than brocoli? and how often have we seen its foliage ravaged, in the autumn, by numerous hordes of the caterpillar of the Cabbage Butterfly!

The larvæ of the *Papilio rapæ* are often found

insinuated into the bosom of the flowers of cauliflowers.

The caterpillar of the Hawthorn Butterfly (*Papilio cratægi* of Linnæus) was very destructive to the foliage of fruit-trees, in some parts of Germany, in the year 1791.*

Dr Bright, in passing through the district of Körmond, in Lower Hungary, says,—"I observed an extensive forest of oak, apparently six weeks later in its vegetation than any we had passed. On inquiry, it appeared that it arose from the ravages of a destructive species of caterpillar (probably that of the *Papilio Betulæ*) stripping the whole forest of its leaves; which, the peasants told me, was here no uncommon occurrence. I find agricultural writers in Transylvania speaking frequently of this circumstance, and their fruit nurseries, in particular, seem to suffer greatly from these insects."

* Rosel, i. chap. 2, p. 15.

CHAPTER VII.

MEANS OF DEFENCE OF BUTTERFLIES.

CREATIVE Wisdom has endowed this tribe of animals, like many others, with certain means of defence suited to the condition in which they are placed. Several larvæ of butterflies will bite very sharply,—these are distinguished, by having at their head a semi-coronet of strong spines; while others have singular anal organs, which may have a similar use.

A numerous host of these little animals escape from birds, and other assailants, by their being so like in colour to the plants which they inhabit, or the twigs of shrubs and trees, their foliage, flowers, and fruit, that their devourers cannot readily see them.

The brilliant colours with which many of the Papilios are invested, is, in all probability, another means of defence, rather than a mere ornament,—they may dazzle their enemies. The radiant blue of the upper surface of the wings of the gigantic butterfly so prevalent in Brasil, the *Papilio Menelaus*, or Silver-blue Butterfly, (see plate 20,) which, from its size, whould be a ready prey for any insectivorous bird, may by its splendour, which, we are

told, is inconceivably bright, produce an effect upon the sight of such birds, which would give it no small chance of escape. Latreille has a similar conjecture with respect to the Golden Wasps.

The long hairs, stiff bristles, and spines, as also the hard tubercular prominences, with which many caterpillars are clothed, may also be intended for their protection. That these are really the means of defence, is rendered more probable by the fact, that, in several instances, the animals so distinguished, at their last change of skin, previous to their assuming the chrysalis condition, appear with a smooth epidermis, without any of the hairs and spines for which they were before remarkable. Mr Kirby has a small lepidopterous caterpillar from Brasil, which is thickly beset with such sharp, strong, branching spines on the upper surface, as would enter the epidermis of the finger; and consequently furnish the caterpillar with effective weapons against enemies less formidable than man.*

Madam Merian has figured an enormous caterpillar of this kind—which, unfortunately, she could not trace to the perfect insect—by the very touch of which, she says, her hands were much inflamed, and the inflammation was succeeded by the most excruciating pain.

The chrysalids are protected by other contrivances *equally* effectual.

* Kirby and Spence, *Intr.* ii. p. 226.

CHAPTER VIII.

OF MALFORMATIONS OF INSECTS.

LEPIDOPTEROUS insects, like other animals, are subject to malformations. We have on record accounts of some curious *lusus naturæ* of these tribes. Such specimens are often termed hermaphrodite insects. They often prove very puzzling to inexperienced collectors; and have been frequently mistaken for distinct species. The term hermaphrodite is completely misapplied, and we are not aware of any specimens having been found entitled to this appellation.

Many instances of *lusus naturæ* in this order of insects might be adduced, but we consider the following as sufficient to show the extent of the phenomenon.

In the collection of insects belonging to Professor Germar are the following curiosities:—

1. *Papilio atalanta.* The left side male, the right side female. The left pair of wings are smaller, and more deeply indented than the right; and the *left antenna is* shorter than the right.

2. *Papilio antiopa*,—of which the right side is male, and the left side female. The right antenna is much shorter than the left.

3. *Papilio phœbe*. The left side is male, and the left antenna shorter than the right; and the left pair of wings smaller, but the colour and margin the same as the right. Hinder part of the body the same as the male.

Mr H. S. Smith, of Leeds, an excellent and zealous entomologist, has in his possession a singular *lusus naturæ* of the Peacock Butterfly, captured in 1827, which is entirely destitute of eyelets on the inferior wings, as well as of the dark ground on which they are placed, and the light coloured circle that surrounds them, is also awanting.

CHAPTER IX.

CLASSIFICATION OF LEPIDOPTERÔUS INSECTS.

THIS is the third Order of Insects, according to the Linnæan classification.

The insects of the order which contains the various kinds of Butterflies, Sphinges, and Moths, have all four wings, covered with scales, or a sort of farina;*

* These scales are so very minute, that they are taken for extremely fine dust. When, however, they are examined through a powerful lens, the scales are found to be placed in the most perfect order, and, where there is a diversity of colour, not unlike mosaic work of the most exquisite description. It cannot but be extremely pleasing, to the contemplative mind, to draw a comparison between the finest productions of human art, and those of the Divine Architect. Comparisons have been made between the irregularity that appears in the finest needle, when examined by a microscope, and the wonderful accuracy of the sting of a bee or a wasp; and the unequal contexture of the finest cambric, when compared with some natural productions. The comparison instituted between mosaic and the scales on the wings of papilionaceous insects, is not less interesting.

Mosaic work *is of* very ancient invention, but the moderns *have greatly improved* the art. Pictures of various subjects

they have a mouth with palpi, a spiral tongue, and a body set with hairs. The scales resemble feathers; they lie over one another, in an imbricated manner,

are formed of it, of amazingly fine workmanship; imitations of buildings, trees, ground of various kinds, and distant mountains; and the human figure, both singly and in groups. These are produced by small pins, of variously coloured glass, stuck into a kind of paste. They are so minute in many cases, that we can hardly discern them to be an arrangement of an infinite number of particles of glass; they rather look like a picture painted with the finest colours, harmoniously blended together. The calculation made by Keysler is, that a piece of eighty square feet, if perforated with tolerable care and delicacy, would employ eight artists the space of two years.

A small piece of the wing of *Papilio Io*, (the Peacock Butterfly,) a quarter of an inch square, was cut out and placed under the third magnifier of an opaque microscope, when seventy rows of scales were counted, and ninety in each row. Consequently, there were six thousand three hundred scales on one side of this small portion of wing; so that the square inch of a wing must contain the astonishing number of one hundred thousand seven hundred and thirty-six scales. The number of glass pins in a square inch of mosaic being only eight hundred and seventy, the coarseness of such a picture, compared with the mosaic of the wing of this insect, is in the proportion of one hundred and fifteen at least to one; that is, such a picture is one hundred and fifteen times coarser than this natural mosaic.

The Peacock Butterfly is one of medium size, and the scales on it are in proportion to its size. What then must be the proportion if we compare with it some of the smaller Butterflies, *whose whole dimensions* are not a quarter of an inch?

The wing of a Peacock Butterfly, prematurely taken out of

or like the tiles on a roof; the shafts towards the body of the insect, and the expansion towards the end of the wing, reflecting often the most beautiful colours. The eyes are reticulated and large; and, besides these, some have two or three stemmata situated on the forehead. The palpi have from two to three articulations; they are hairy, standing outwards, and sometimes a little upwards. Butterflies, with their spiral tongues, suck the nectareous juices of flowers; but, in general, they need little food; some, indeed, whose tongue is very short, seem to take no nourishment at all. They have, on each side, nine spiracula, or organs of respiration, of which one is situated on the thorax, the other eight on the segments of the abdomen; the last segment is without any. The principal function of the perfect insect is to propagate its species, for which purpose the female, from a peculiar instinct, deposits her eggs on such plants, and in such places, as afford the proper nourishment to the larva when excluded; after which both sexes soon cease to live.

a pupa, was subjected to the same mode of investigation, when it was found to be nine and a quarter times finer than that of the perfect insect; and that the square inch contained nine hundred and thirty-one thousand eight hundred and eight scales to the square inch. So that this natural mosaic must be above ten hundred and sixty-three times finer than the mosaic of the boasted pictures of modern Rome, where *ingenuity, animated* by zeal, has exerted its utmost efforts.

Of this order Linnæus forms three genera, namely, *Papilio, Sphinx,* and *Phalæna;* which are called in English, Butterflies, Hawk Moths, and Moths.

The French authors have subdivided this order into a variety of families, tribes, and genera; but to enter into these would occupy a space far beyond our limits. I therefore confine myself to the Linnæan arrangement.

The first genus to be considered is that of *Papilio,* or what, in our language, is termed Butterfly; which Dr Johnson says is so named because it first appears in the beginning of the season of butter. According to Dr Webster, it is much more probably derived from the colour of a yellow species, which is the most common.

The varied and splendid tints of Butterflies, and their generally elegant and graceful forms, afford ample means for contemplation and admiration. Miss Jarmyn has justly observed, that the tribes of these animals, which inhabit the tropics, are at least equal in the brilliancy of their general colour to those of the birds of the same countries. Linnæus, alive to all the dazzling splendour of Butterflies, emphatically says—"See! the large, elegant, painted wings of the butterfly, four in number, covered with delicate feathery scales! With these it sustains itself in the air a whole day, rivaling the flight of *birds,* and the brilliancy of the peacock. Consider *this insect* through the wonderful progress of its

life,—how different is the first period of its being from the second, and both from the parent insect! Its changes are an inexplicable enigma to us: we see a green caterpillar, furnished with sixteen feet, feeding upon the leaves of a plant; this is changed into a chrysalis, smooth, and of golden lustre, hanging suspended to a fixed point, without feet, and subsisting without food. This insect again undergoes another transformation, acquiring wings and six feet, and becomes a gay butterfly, sporting in the air, and living by suction upon the honey of plants. What has Nature produced more worthy of our admiration than such an animal coming upon the stage of the world, and playing its part there under so many different masks?"

It is no wonder that mankind were early struck with these wonderful phenomena, and that the ancients should have considered a butterfly as an emblem of the human soul. It has afforded much scope for poetry, and served to heighten the beauty of allegorical fictions: here is an example of the latter:—

> Now on broad pinions from the realms above,
> Descending Cupid seeks the Cyprian grove;
> To his wide arms enamour'd Psyche springs,
> And clasps her lover in aurelian wings.*

* Darwin's *Temple of Nature*.

Genus *PAPILIO*.—Linnæus.

Generic character.—The antennæ growing thicker at the extremities, in general club-shaped, or capitated; the wings, when at rest, erect, and meeting upwards. The species all fly by day.

This genus comprehends those insects called in English Butterflies, which fly by day. The first pair of legs in some of them are short, and used rather as hands for cleaning themselves, than as feet for walking. Their flight is in general quick. The caterpillars have all sixteen feet, and are for the most part prickly. Some, however, are smooth, others set with short hairs; some have a sort of tail, and others have two blunt horn-like feelers on the head.

Linnæus divides this genus into six families. The names of the first, being mostly exotic, he has taken from those of the Trojan and Grecian chiefs; those of the others, as most of them are European, and their history and habits better known, are taken chiefly from the plants on which the caterpillars feed.

I. Equites.—Those whose upper wings are longer *from* the posterior angle to the apex, than from





1.

PUPA AND LARVA OF THE PEACOCK BUTTERFLY.

Papilio Io.—BRITAIN.

the angle to the base. Their antennæ are often filiform.

They are subdivided as follows:—

A. Troës; often black, with bloody spots on the breast.

B. Achivi; without the bloody spots; an ocellus at the angle of the tail.

. HELICONII.—With quite entire and narrow wings, which are sometimes naked, especially towards the extremities; the upper ones oblong, the under ones very short.

I. PARNASII.—With quite entire wings; the upper ones rounded.

V. DANAI.—With entire wings.

A. Candidi; with white wings.

B. Festivi; with wings variously coloured.

. NYMPHALES.—With indented wings.

A. Gemmati; the wings ocellated.

a. ocelli, in all the wings.

b. ocelli, in the upper wings.

c. ocelli, in the under wings.

B. Phalerati; the wings without ocelli.

I. PLEBEII.—Small; the larva generally contracted.

A. Rurales; the wings with obscure spots.

B. Urbicolæ; the wings with spots, which are often pellucid.

THE PEACOCK BUTTERFLY.

Papilio Io.—BRITAIN.

PLATE II.

Papilio Io, *Merian's Ins. Eur.* i. 226. *Alb. Ins.* pl. 3. *Wilk. Pap.* 55. pl. 3. A. 2. *Harris' Aurelian*, pl. 8. *f*, *k*, i.—Vanessa Io, *Latreille.*

Specific character.—The head, throat, and abdomen of this splendid butterfly are of a deep reddish brown, and covered with pretty long hairs. The wings are angular, considerably indented at their posterior margins, and surrounded by a broad black band, the superior ones being of a high toned brown, approaching to red, with large compound eyelets, reddish in the centre, and the inner half of the outer circle of a rich golden yellow, the outer half being of a fine sky blue, with several dark spots in it. These eyelets are bounded on their inner sides by a triangular semilunar black patch, beyond which is a wedge-shaped patch of rich yellow, bounded with an abbreviated black band; on the exterior margin is a transverse band of golden yellow, thickly punctured with black; in the centre of the wing are two pretty large sky-blue spots. The lower wings are of a pale reddish brown, with the margins considerably indented, and a deep, black, broad border, with sub-



2.

THE PEACOCK BUTTERFLY.

Papilio Io.—BRITAIN.

caudal wings. There are on each of the lower wings a large oval sesquialterous eyelet, of deep black, surrounded by an ash-coloured ring, bounded on its outer extremity by another ring of black: the spots on the centre are deep blue, with a white semi-lunar one at top.

This insect is subject to considerable variety, in some of which the margins are deep brown. The under side of this butterfly is almost entirely black.

The caterpillars of the *Papilio Io* are produced from eggs which are deposited in the spring of the year on nettles. The larvæ are of a fine deep black, thickly beset with sharp spikes, and finely powdered with minute white specks. The belly legs are of a tawny brown, and the others black. They live in society, and are seen in the early part of summer feeding on nettles. Shortly after the little animals are hatched, they begin to spin for themselves a large and commodious web, into which they fly for shelter on the approach of rain, which the exquisite sensibility of their nervous system enables them to foresee a considerable time previous to its falling; they therefore may be depended on as excellent prognostics of changes in the state of the atmosphere. They also take refuge under this covering during the night.

When they have attained their full growth, which is about the beginning of July, they seek out some *proper place* where they can safely assume their

chrysalid form. In the performance of this change, they suspend themselves vertically, with the head downwards; and the pupa, thus pendent, continues for about twenty days, at the end of which time the insect becomes perfected, bursts from its shell, expands its wings, and flies away.

The Peacock Butterfly is to be found all over Europe, especially in the more temperate parts of it. It is not uncommon in the south of England, but it is extremely rare in the north. During the winter it conceals itself, and does not die until it has deposited its eggs in the ensuing spring.

This *Papilio*, also the *P. urticæ*, *atalanta*, *polychloros*, and several allied species, soon after emerging from the chrysalis form, when they take their first flight, discharge a few drops of a reddish coloured fluid, which is sometimes of the intensity of blood. In situations where these insects are numerous, it has had the appearance of a shower of blood, and, by early writers, was considered the precursor of some extraordinary event. Ovid commemorated an occurrence of this kind among the prodigies which took place after the death of the great dictator, in the following passage:—

Sæpe faces visæ mediis ardere sub astris:
Sæpe inter nimbos guttæ cecidere cruentæ.

Which has been thus translated,—

With threat'ning signs the lowering skies were fill'd,
And sanguine drops from murky clouds distill'd.

The explanations of the appearance of blood on the earth, are historically divided into four distinct periods,—namely, first, the theocratic, or period of miracles; second, the period of the Hippocratic school; third, the physical, or natural historical; and fourth, the atmospherical, or cosmical.

The first of these periods extends from the com mencement of history, down to the time of Cicero, the Roman orator. In the second, the admissibility of miracles began to be questioned; and a belief in a crude and veiled condition of atmospherical and terrestrial moisture became prevalent. The third period was commenced by Peiresc of Aix. And the fourth was established by Chladnei, who was afraid of the encroachments of natural historians, in accounting for these phenomena.

In the first period, we have recorded in the Books of Moses the most ancient accounts of these miracles, —that of the blood-coloured water from Egypt, which was an immediate operation of the Almighty, and performed by Moses in the presence of Pharaoh. The Nile became red and fetid, the fishes died, and all the waters of Egypt were changed in the same manner.*

Homer took advantage of appearances of a similar kind—the showers of bloody rain which had been observed previous to, and at his time—alluding to

* *Exodus*, chap. vii. verses 19, 20, 21.

them with enlivening effect, and representing them as a direct encroachment of the gods on the established laws of nature.

The Greek and Roman classics frequently make mention of the Red Sea, as deriving its name from the red colour exhibited by its waters at different periods, owing to the showers of blood, which they considered as the immediate operations of supernatural powers, and as direct violations of the established laws of nature. Cicero was the first to question the preternatural origin of these phenomena, and endeavoured to account for them by physical means. The red colour of water he accounts for from its holding in solution a mixture of red-coloured earthy ingredients, and the express traces of blood drops on plants and stones to the bloody colouring of moisture.

From the time of Cicero till the beginning of the seventeenth century, we have many records of such natural phenomena; but no accurate or philosophical investigations of them have been offered. There was an absurd doctrine supported by the Hippocratic believers, among whom was the physician Garcæus, who, in 1568, says, blood-rain is rain boiled by the sun.

The aim of Chladnei was, the advancement of the study of truly cosmical and atmospherical bodies.

It would be foreign to our subject, although extremely interesting, to introduce, in chronological

order, the sudden overflowings of rivers with red or bloody water which have taken place, without any previous rain of that colour; or of lakes and stagnant waters which have been suddenly or gradually coloured, without any preceding red rain. But we may mention, that modern discovery has led to a belief, that all these can be accounted for as arising from the water containing innumerable animalculæ, of the order called by naturalists infusory animals. In the year 1797, Girod Chantron observed a pond in France to be of a blood-red colour. He examined it accurately, and found, that the water, which appeared to be of a brilliant red colour, the shade of which was between cinnabar and carmine, was not itself actually red, but assumed this appearance from innumerable animalculæ, which were not visible to the naked eye, but which could be distinctly seen by the aid of a microscope.* Captain Scoresby mentions, that, in 1820, he observed the water of the Greenland Sea striped alternately with green and blue, and that those particular colours were produced by animalculæ, of such extreme minuteness, that he reckoned, in a single drop of water 26,450 animalcules; hence, reckoning 60 drops to a drachm, there would be in a gallon a number equal to one half of the population of the globe. This coloured water, to the extent of six degrees of latitude, formed one-fourth of the sur-

* *Bullet de Sc. Nat.* a. 6.

face of the Greenland Sea.* Although this observation does not belong to the bloody colour of water, yet it clearly indicates the abundance of microscopic organic beings in water.

The meteoric substances, which are usually colourless,—such as dew, snow, rain, and hail, have been said to fall blood-red from the atmosphere.

In Stowe's *Chronicle*, we have two accounts of showers of blood; he says, that, in the reign of Rivallo, 1766 years before Christ, "it rained bloud three dayes; and then a great mortalitie caused almost desolation." He afterwards writes,† "Brithricus, of the blood of Cerdicus, was made king of the West Saxons, (about A. D. 793,) and ruled seventeen yeares. In his time it rained blood, which, falling on men's cloathes, appeared like crosses."‡

There are two passages in Homer, which, however poetical, are applicable to rain of this kind; and the accounts of the bloody sweat on some of the statues of the gods, mentioned by Livy, must be referred to the same phenomena; as the predilection of the ages for marvel, and the want of accurate investigation in the cases recorded, as well as the occurrence of these atmospherical depositions in our own times, incline us to include them among *blood-red drops* deposited by insects.

Many accounts of occurrences of this kind

* Scoresby's *Arctic Regions*, vol. i.

† Page 9. ‡ Page

recorded, but erroneously investigated, as related in Roman history, prior to the birth of Christ. Dio Cassius, in particular, considered, that the blood rain which fell in Egypt in the time of Octavian, must be recorded as a thing very remarkable, because it never rained in Egypt. This however is a mistake.

We are told that, in the year A. D. 65, during the reign of Nero, blood rain fell, which tinged the rivers with a red colour. Two other instances are recorded in the tenth century; one in the eleventh; two in the twelfth; one in the thirteenth; two in the fourteenth; one in the fifteenth; and five in the sixteenth.

The circumstances under which these isolated incidents happened, are not related,—whether these showers fell from clouds, or whether there were an abundance of clouds in the atmosphere at the time; nor are we informed if these red showers were actually seen falling, or whether they were merely observed on the ground, and hence concluded to be drops of red rain which had fallen. These accounts have, for the most part, been accompanied with such superstitious notions, and additions so manifestly false, that we venture to account for them by phenomena within the reach of physical science.

It is no new discovery that insects are the cause *of showers of* blood; for Sleidan mentions, that, *in the year 1553*, a great part of Germany swarm *with immense* multitudes of butterflies, and

they sprinkled the leaves of plants, buildings, and clothes, with blood coloured drops, as if there had been showers of blood.*

M. de Reaumur was the first who recorded a satisfactory and philosophical explanation of this phenomenon. An extensive shower of this kind took place at Aix, in France, in the beginning of July 1608, which threw the people of that place into the utmost consternation. It fell in the suburbs, and extended for several miles round the town. The celebrated M. de Peiresc, a philosopher who, with his varied acquirements, had studied the habits and economy of insects, was consulted on this momentous occasion. On examination, he found the walls of a cemetery near the place, as well as those of several villages, spotted with large drops of a blood-red liquid. A short time prior to this, he happened to pick up a large chrysalis, which he had carefully laid up in a box. Soon after its metamorphosis into the butterfly state, he found that it had emitted a drop of blood-coloured liquor on the bottom of the box, of the size of a French sol. On comparing this with the spots on the stones in the roads, and in the fields, he found that they were identically the same; and he then unhesitatingly pronounced that the latter proceeded from the same cause. His opinion was strengthened by having observed, that prodigious *numbers of* butterflies disported in the air a

* *Mouffet, Insect. Ann. Theatrum*, p. 107

time. He farther noticed, that these miraculous drops of what the people supposed bloody rain, were never found in the middle of the town, and appeared only in places bordering on the country; and that they were not observed on houses higher than the ordinary flight of butterflies. M. de Peiresc explained the phenomenon to many curious and learned individuals, and established it as an incontrovertible fact, that the imagined shower of blood was in reality but the drops of a red liquid emitted by the butterflies. The same idea seems to have been entertained by Swammerdam, though he does not appear to have verified it from personal observation.

Reaumur mentions an instance of a gardener at Rouen being much terrified by digging up some of the singular cases of the leaf-cutter bees. These he considered as the results of witchcraft, and as foreboding some dreadful calamity. He exhibited them to the priest of the parish, who advised him to proceed immediately to Paris, and show them to his master. But the gardener had more sense than his pastor, and went first to the eminent naturalist Nollet with them. He knew well what they were; and, while the astonished gardener eyed him with superstitious awe, Nollet opened one of the cases and pointed out the grub it contained, and thus dispelled his apprehensions.*

* Reaumur, vi. p. 99.

In the year 1780, Romberg noticed a shower of blood, that had excited universal attention, and which he could the more satisfactorily show to be produced by the flying forth and the casting of bees, as the phenomena in the place around the beehives themselves were remarkably striking. From this fact it is evident, that the appearance is attributable to other insects as well as the lepidoptera.

We have many other records of showers of blood, which, no doubt, may be referred to the same source; and it is worthy of remark, that these are invariably stated to have taken place in warm seasons of the year, when the papilionaceous tribes are most numerous.

This provision in the physical habits of butterflies, is analogous to a similar process in other animals, and affords a satisfactory explanation of what has been looked upon as a prodigy, and as fearful prognostics of some approaching direful event. That which historians recorded as preternatural, is now stripped of its terrors, and is ranged among circumstances which happen in the common course of nature. These appearances, both in ancient and modern times, in the hands of wicked men, had a wonderful influence in farthering their base designs over the superstitious.



3.

THE NETTLE TORTOISE-SHELL BUTTERFLY.

Papilio Urticæ.—BRITAIN.

THE NETTLE TORTOISE-SHELL BUTTERFLY.

Papilio Urticæ.—BRITAIN.

PLATE III.

Papilio Urticæ, *Linn. Syst. Nat.* ii. p. 777. No. 167.—*Wilk's Pap.* 56. pl. 3. *a.* 5.—Vanessa Urticæ, *Latreille.*

THIS is one of the most beautiful papilionaceous insects of Britain. The ground colour of its wings is red, the upper wings are marked with alternate abbreviate bands of black and pale orange, or golden yellow, on the exterior margin. There are three black spots on each wing, and mottled at top, the under one large, oval, with a yellow spot at its base; the posterior margins of both superior and inferior wings have a broad black band, edged with yellow at their outer extremity, and, in their centre, a catenated fascia of blue; these margins are considerably indented; body, head, and antennæ, black; the former being thickly set with dark brown hairs; lower edge of the segments brown.

The *Papilio Urticæ* makes its first appearance in a winged state about the middle of April. It is a short lived insect; it lays its eggs in the beginning of May in great numbers on the higher stalks of nettles, and dies very shortly afterwards.

The eggs of this insect are covered with a moist

glutinous substance, by means of which they adhe firmly to the plants on which they are deposite About the middle of May, the young caterpilla emerge from this envelope, and may be observed, a light green colour, congregated and moving abo on the tops of the nettles, under a web of exquisite fine fibres, which covers the whole tops of the plan and is taken for a spider's web—to which it has strong resemblance—by those unacquainted with t history of insects. It is not long before they ca their first skin, at which time they shift to a fre part of the plant, and leave behind them their o covering, adhering to the web. On acquiring the third skin, they again change place, but still ke under the protection of their web. In this chan they become black; after which they quickly i crease in bulk, and are soon so large, that the cor munity are forced to separate into distinct compani They undergo, altogether, six changes of skin wh in the caterpillar state, in the last of which th become solitary, living a retired life, quite remo from each other; and, in this condition, they ma such ravages among the nettles, that nothing r mains on the plants to which they attach themselv but the fibres of the leaves and stalks. These cat pillars are frequently so numerous, and so thick studded on the plants, as to give them the appe *ance of being* covered with black velvet.

The larvæ of the Nettle Tortoise-shell Butte

arrive at their full size about the beginning of June, when they throw out from their tails a web, by which they suspend themselves under the leaves, or on the stalks of nettles, and are transformed into chrysalids. These are at first of a green colour; but, in the course of two or three days, they change either into a bright golden-yellow, or greenish-brown, approaching nearly to bronze-green. In this condition they continue for about twenty days, when they burst from their casement, and assume the perfect, or butterfly state.

THE ORIENTAL EMPEROR.

Papilio Ripheus.—China.

PLATE IV.

Papilio Ripheus, *Gmelin's Linnæus*, 2235.—*Fabr.* *Ins.* p. 6, n. 43.—*Cramer*, *Pap.* 33, t. 385. f. A.

The superior wings are golden green, pale wards their interior margins, and clouded with longitudinal patches of black. The colour de to a brilliant verdigris green, as it approache exterior margin. Inferior wings golden green digris green at their anal margin, and with clouds of black. Near the centre, in each, is a undefined spot of deep carmine, with two black in the middle. Each of these wings is furn with three acute points, and three caudate v The body is quite black; the antennæ are sub When extended, this butterfly measures, fro tip of each wing, five inches and a quarter.

The caterpillar of this species is unknown; in all probability, it bears a strong resemblar that of the *Papilio leilas*, which has been figu Madam Merian's *Surinam Insects.*

Besides the extreme rarity of this species, i be reckoned the most beautiful of this splendid *It is a native* of China, and various other pl *the East.*



4.

THE ORIENTAL EMPEROR.

Papilio Riphæus.—China. (♂





5.

THE HECTOR TROJAN.

Papilio Hector.—INDIA.

THE HECTOR TROJAN.

Papilio Hector.—INDIA.

PLATE V.

Papilio Hector, *Linn. Syst. Nat.* p. 744.—*Shaw's Nat. Miscellany*, pl. 271.

THIS *Papilio* is wholly of a deep velvet black, the upper wings clouded with cleft patches of pale ochre yellow, and the centre and lower parts of the under wings, head, and tail, with crescent-shaped regular patches of bright scarlet; and with an edge, or fillet of white round the whole margins. Inferior margin with a caudate wing.

The Hector Trojan is a native of India, but of rare occurrence, and measures four and a half inches from tip to tip of extended wings. The antennæ are very long and slender.

The strong contrast of the deep black and scarlet of this insect, gives it a striking effect.

THE AMPHRYSIUS BUTTERFLY.

Papilio Amphrysius.—JAVA.

PLATE VI.

Papilio Amphrysius, *Merian's Ins. Surinam*, t. 72 ?—*Cramer*, t. 219, f. A.—*Shaw's Nat. Miscellany*, pl. 650.

THE upper wings are black, with yellow streaks, and slghtly indented. The lower wings are yellow, with a broad vandyked border of black, and considerably indented. The upper part of the body is deep black; and the segments, or annular process, is yellow. The eyes are scarlet.

Although this butterfly has but two colours, yet, from the strong contrast of these, it is a beautiful insect.

The Amphrysius Butterfly is a native of the islands of Java and Amboyna, and measures upwards of five inches and a quarter from the extremity of one wing to that of the other.



6.

THE AMPHRYSIUS BUTTERFLY.

Papilio Amphrysius.—JAVA.







7.

THE CRAMERIAN BUTTERFLY.

Papilio Cramerianus.—JAVA.

THE CRAMERIAN BUTTERFLY.

Papilio Cramerianus.—JAVA.

PLATE VII.

Papilio Iphigenia, *Cramer, Desc. de Papillons*, pl. 67, fig. D. F. —Papilio Cramerianus, *Shaw's Nat. Miscellany*, pl. 852.

THE wings are scalloped and black. Upper wings, with three sesquialterous blue bands, and variously spotted with the same colour. They have also six oblong spots of white, partly edged with pale blue, and a quadruple macular band of bluish white on the posterior margin, and a large triangular scarlet spot on each. The under wings have a very large white, transverse, and lunated band, edged with shining blue. Next the lower posterior margin, there is a row of white semilunar spots, above which is an undulated belt of blue; and still higher up, a macular band of the same colour. Under surface of the wings variously clouded, streaked, and spotted with black. The colour, orange and gray. The body is brown, and black in the middle. The eyes are red; and the antennæ slender, with large club shaped points.

This elegant butterfly is a native of the island of Java, and measures four inches, with extended wings.

THE GALANTHUS BUTTERFLY.

Papilio Galanthus.—SURINAM.

PLATE VIII.

Papilio Galanthus, *Turton's Linn.* iii. p. 58.—*Cramer, Desc. de Papillons*, iii. pl. 25, fig. D. E.

THE surface of the upper wings of the Galanthus Butterfly is scarlet; the posterior margins, which are scalloped, have a pretty broad margin of deep black, which extends upwards of half an inch on the anterior margin; and nearly close to the tips are two white spots. There is a large and broad articulate band extending nearly across the wings; the under wings are black, with a broad articulate band of scarlet. The body is black, and the eyes scarlet. The antennæ are very slender.

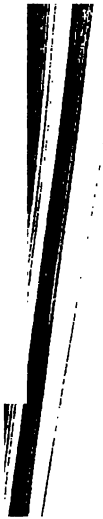
The strong contrast of the intense black and the scarlet, renders this a very striking insect. It inhabits Surinam.



8.

THE GALANTHIS BUTTERFLY.

Papilio Galanthis.—SURINAM.





9.

THE AMPHINOME BUTTERFLY.

Papilio Amphinome.—SURINAM.

THE AMPHINOME BUTTERFLY.

Papilio Amphinome.—SURINAM.

PLATE IX.

o Amphinome, *Merian's Ins. of Surinam*, pl. 7. —*Cramer, Desc. de Papillons*, pl. 54, fig. E. F.

HE wings of this insect are indented, black, and led with bluish green above; the superior ones ed, both on the upper and under sides, with a , broad, white band, which extends across the s towards their tips, from the anterior to the rior margin, in an oblique direction; the inner ins are of a raw umber colour. Under side of the r wings black, clouded with the same green as pper surface; the lower wings are black, various- uded, and marked with scarlet: all the poste- nargins have a border of semilunar green spots. ıe caterpillar is three inches long, of a dusky r, with three longitudinal green spots, extend- om the one extremity to the other; the head is shed on its coronal surface with eight long horn- pines, and the tail with two. It feeds on the *ıeria rubra*, changes into a chrysalis in June, emerges the complete butterfly in the month *ly.*

abits South America, and Surinam.

THE ATYS BUTTERFLY.

Papilio Atys.—SURINAM.

PLATE X.

Papilio Atys, *Cramer, Desc. de Papillons*, pl. 269, fig. E. F. —*Shaw's Nat. Miscellany*, pl. 951.

THE wings of this pretty *Papilio* are black, with the body, and centre of the wings, of a rich and clear verdigris green, spreading in streaks from the body through the black; near the anterior margin on each wing are two ovate black spots, blue in the middle; there are two caudate appendages on the base of the lower wings, which terminate in a circular nob. The eyes are scarlet.

The *Papilio atys* is a native of Surinam, and is represented in the plate of the natural size.



10.

THE ATYS BUTTERFLY.

Papilio Atys.—SURINAM.





11.

THE MARSYAS BUTTERFLY.

Papilio Marsyas.—South America.

THE MARSYAS BUTTERFLY.

Papilio Marsyas.—South America.

PLATE XI.

Papilio Marsyas, *Linn. Syst. Nat.* p. 788.—*Shaw's Nat. Miscellany*, pl. 888.

The wings are entire; the anterior and posterior margins have a very broad band of black, while the area of the upper wings is of a rich azure blue, softening, as it descends, into a fine deep straw yellow. The lower wings are of a pale bluish green, with two long slender caudate wings on each, furnished at the points with round knobs; above the lower edges are crescent-shaped black spots, surmounted by a round black spot, at the outer side of which is placed an upright club-shaped black spot. The body is black; straw brown on the centre.

This beautiful little *Papilio* is a native of South America. It is figured of the natural size.

THE IMPERIAL TROJAN.

Papilio Priamus.—AMBOYNA.

PLATE XII.

Papilio Priamus, *Linn. Syst. Nat.* ii. p. 744. No. 1.—*Clerk, Icon. Ins. Var.* t. 17.—*Shaw's Nat. Miscellany,* pl. 15.

THIS superb butterfly has the upper surface of its wings of a brilliant green, shaded of a paler colour towards the upper and lower discs of the superior wings; all the wings have a black margin entirely surrounding them; in the centre of the upper wings are two large longitudinal black patches, which occupy nearly the half of them; on each of the lower wings are four large circular black spots, and a golden yellow square spot close to the edge of the upper surface; the head, and upper part of the back are black, the latter with a large oval spot in the centre, the upper half of which is green, the lower half yellow, and two smaller green spots beneath it; the eyes are bright fawn colour; the abdomen is of a pale chestnut; the inner edges of the wings are pale brown; the antennæ are thick at the top, but taper to a point.

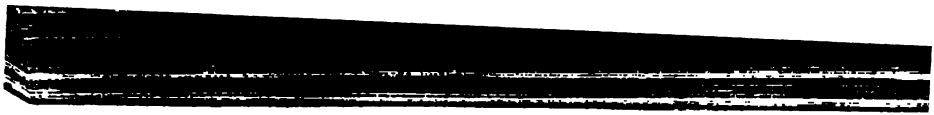
Linnæus considers this to be the most beautiful *of all the* papilionaceous tribe of insects. He



12.

THE IMPERIAL TROJAN.

Papilio Priamus.—AMBOYNA.



"It is by far the most august of all the Papilios, being all over of a silky appearance; and it may be doubted whether Nature has produced any object more beautiful amongst insects."

The Imperial Trojan is a native of the island of Amboyna, and it is regarded as one of the most curious and valuable of butterflies. Nothing can exceed the richness of the green colour, which, in particular lights, is not only of an appearance far superior to the finest satin, but has also a golden tinge diffused through it, which produces the most beautiful contrast with the deep blue green on the rest of the wings.

The *Papilio Priamus* measures upwards of seven inches and a half from the tip of one wing to that of the other, and stands foremost among the Linnæan division of the large butterflies, which forms the two sections of Trojan and Grecian Warriors, or Equites. The butterflies of those sections are distinguished from all others by the remarkable shape, or outline, of their upper wings, which are larger, if measured from the hinder corner to their anterior extremity, than from the same point to their base. The Trojan Equites have generally red, or blood coloured spots on each side of their breasts. The prevailing colour, also, of this division is black.

THE ÆNEAS BUTTERFLY.

Papilio Æneas.—COCHIN CHINA.

PLATE XIII.

Papilio Æneas, *Linn. Syst. Nat.* ii. p. 747. No. 16.—*Gmelin's Linn.* p. 2233.—*Shaw's Nat. Miscellany,* pl. 512. fig. 1.

THE whole upper surface of the wings of the Æneas Butterfly is black; in the centre of the superior ones is a large, irregular, bright green patch; the under wings have each five oblong-oval crimson radiated spots; the upper wings are slightly, and the under ones deeply, indented on their posterior margins; the body is black, furnished on each side with a row of crimson spots; on the shoulders, there is a crimson triangular spot; the head and eyes are green.

This rare and splendid butterfly is a native of Cochin China. It measures four inches and an eighth in breadth.



13.

THE ÆNEAS BUTTERFLY.

Papilio Æneas.—Cochinchina.



14.

THE ANCHISES BUTTERFLY.

Papilio Anchises.—SURINAM.

THE ANCHISES BUTTERFLY.

Papilio Anchises.—SURINAM.

PLATE XIV.

Papilio Anchises, *Linn. Syst. Nat.* p. 146.—*Seba Mus.* iv. pl. 7, fig. 27, 28.—*Merian, Ins. Surinam,* pl. 17.

THE whole upper surface of the wings of this *Papilio,* as well as the body, is black; the posterior margin of both upper and under wings are considerably indented, with a row of semilunar interrupted white spots along the margin of the upper wings, and a white, continuous, narrow border on the lower ones; on each of the upper wings is a large patch of pure white, and the under wings have each six oblong-oval upright spots of crimson; on the internal margin of the wings, parallel with the crimson spots, are two small white dots on each wing; the tail is ciliated, and the antennæ thick at the base and tapering to a point, the tips being lance-shaped. The breadth of the butterfly, when the wings are extended, is five inches and three quarters.

According to Madam Merian, a small species of lemon grows in the woods of Surinam, rising to the height of a tall apple-tree, but with leaves and flowers of not more than half the size of the common kind. On these trees are found great numbers

of the caterpillars of the Anchises Butterfly, collected together in groups, and adhering to each other like snails. Their colour is brown, the annulations being intersected by numerous white longitudinal stripes; and, when touched, they protrude from their front a pair of soft, yellowish horns, as if to defend themselves, or to attack their enemies. Madam Merian kept some of these caterpillars on lemon leaves till the 20th March; at that period they changed into a chrysalis, out of which, on the 2d of April, proceeded the Butterfly.



15.

THE ANDROMACHA BUTTERFLY.

Papilio Andromachus.—South America.

THE ANDROMACHUS BUTTERFLY.

Papilio Andromachus.—SOUTH AMERICA.

PLATE XV.

Papilio Andromachus, *Shaw's Nat. Miscel.* pl. 635.—*Linn. Syst. Nat.* p. 744.—*Cramer, Desc. de Papillons*, pl. 56, f. A. B.

THIS large and curious insect is of a dull fawn colour, fulvous at the posterior margin, within which is a broad, black, doubly vandyked band, and a large triangular patch of black, extending from the insertions of the wings three-fourths across them; they are slightly indented; the under wings have a greatly broader black band than the upper ones; it reaches to the very margin, with a double row of equidistant, oblong, fawn-coloured spots within the edge, and a single row of four round spots, of the same colour, towards its upper extremity; the body is dark brown; the antennæ are very long and slender.

This insect is an inhabitant of the warmer parts of South America. It is of a large size, extending, from the tips of the wings, to six inches and three quarters.

THE ORANGE TIP BUTTERFLY.

Papilio Cardamines.—BRITAIN.

PLATE XVI.

Papilio Cardamines, *Linn. Syst. Nat.* ii. 261, No. 85.—*W*
Pap. ii. p. 50, tab. a, 5.—Pontia Cardamines, *Latreil*

THE wings are rounded, white; with the e
very slightly scalloped; posterior margin black,
a row of white spots near the edge; within the b
edge is a large patch of orange, having a black
in the middle; under side of the wings marbled
green; the under wings are white, marbled
gray, and an interrupted black border on their c
margin; the body is white, with an oval black n
on the back, and triangular black patches on
segments of the abdomen; the eyes are green,
beneath each there is a small circular spot of r

The female has no orange tip to the wings.
specimen from which our figure is taken was for
and is nearly double the size of those foun
Britain.

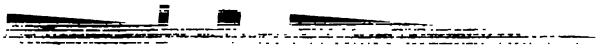
This pretty butterfly is also called the Lady o
Woods, and may be taken in great abundance ir
month of May. The caterpillar is common in
and June; is of a deep reddish brown colour,
a white stripe above the legs, and feeds on the



16.

THE ORANGE-TIP BUTTERFLY.

Papilio Cardamines.—BRITAIN.



purse, (*Thlaspi bursa pastoris,*) common lady's smock, field cabbage, &c. (*Cardamine pratensis.*) Harris says it also feeds on wild cole.

The caterpillar changes to a chrysalis about the end of June, which is greenish, with a yellow streak on the sides, and on the wing-cases of the male is a saffron-coloured spot, and it is not till the following May that it becomes a butterfly.

This *Papilio* is common in fields and lanes, and near woods.

THE ADONIS BUTTERFLY.

Papilio Adonis.—SURINAM.

PLATE XVII.

Papilio Adonis, *Linn. Syst. Nat.* p. 744.—*Cramer, Desc. de Papillons*, pl. 61, fig. A. B.

THE wings on the whole upper surface are of a bright Antwerp blue, and slightly denticulated; the extreme points of the upper wings are black, and the lower angle of the under ones the same; towards the points of the upper are two white spots on each; the under surface of the wings is gray, clouded with undulated patches of pale brown and dark gray, with five ocellated, fawn-coloured spots.

The breadth of the extended wings is four inches and a half.

This highly beautiful insect is a native of Surinam, and, according to Madam Merian, it is abundant in that country.



17.

THE ADONIS BUTTERFLY.

Papilio Adonis.—SURINAM.





18.

THE GREAT COPPER BUTTERFLY.

Papilio Hippothoe.—Britain.

THE GREAT COPPER BUTTERFLY.

Papilio Hippothoe.—BRITAIN.

PLATE XVIII.

Papilio Hippothoe, *Linn. Syst. Nat.* ii. p. 793, No. 254. —*Donovan's Brit. Ins.* pl. 217.

THE whole upper surface of the wings has a brilliant red copper lustre, as well as the body; all the wings have an external border of deep black, and the upper ones a row of oblong, transverse, equidistant, black spots within the border, and two black spots near the centre of the wings; the border on the lower wings is vandyked at its upper edge; a black longitudinal line runs along the centre of the body; the lower wings are semi-swallow-tailed.

The under surface of the upper wings is brownish ash colour, ocellated with black, having a broad cream-coloured border; the lower wings are grayish blue, and ocellated with black; exterior margin of same colour, within which is a broad border, or fillet, the same colour as the upper wings, with a row of equidistant black round spots on each side; body, beneath, fawn-colour.

This is the largest of the Copper Butterflies which is found in Britain; it is not uncommon in Scotland. The female is larger than the male, and *with a greater* number of black spots on the wings.

PALE CLOUDED YELLOW BUTTERFLY.—FEMALE.

Papilio Hyale.—BRITAIN.

PLATE XIX.

Papilio Hyale, *Linn. Syst. Nat.* ii. 764, No. 100.—*Fav. So.* 1040.—*Donovan's Brit. Ins.* pl. 238.

THE Hyale Butterfly extends two inches and a quarter from the tips of the wings; the antennæ are short; the head, throat, and abdomen are of a brownish yellow; the superior wings are of a yellow orange; on the upper wings, a black, on the lower, an orange spot in the centre, and a deep irregular border of black on the margin. The female has a row of yellow or white spots in the centre of the border, which in both sexes is fringed.

This insect has been described by several authors, English as well as foreign, and the naturalists of Germany have generally noticed it. In Britain, insects of this order seem to be, in general, peculiar to our country; but the Clouded Yellow Butterfly appears to be found in almost every part of Europe, and is said to abound also in Africa and America, differing a little, of course, with the locality.

The breadth of this insect, in England, rarely exceeds two inches; but, influenced by a warmer *climate,* it is found of a much greater size. Northern countries do not seem to be so congenial to the growth



19.

THE CLOUDED YELLOW BUTTERFLY.

Papilio Hyale.—BRITAIN.



of papilionaceous insects, as more southerly latitudes. In Britain, the *Papilio Hyale* is considered rare, although it has occasionally been abundantly found in Kent and the neighbouring counties. In the year 1793 it abounded in these districts. The fly is to be taken in autumn, but seldom after August.

THE SILVER-BLUE BUTTERFLY.

Papilio Menelaus.—South America.

PLATE XX.

Papilio Menelaus, *Linn. Syst. Nat.* p. 749.—*Merian's Ins. Sur.* pl. 53.—*Cramer, Desc. de Papillons*, ii. pl. 21.

The upper surface of the wings of the Silver-Blue Butterfly, is of a brilliant verdigris green; the anterior margin has a broad black band, in which are five oblong-ovate transverse white spots; round the whole posterior margin is a narrow black border, the margins being indented; the body and eyes are black; the whole under surface of the wings clouded with brown, and marked with large ocellated spots; the antennæ are short, and thickening towards the points, which are club-shaped; extent of the wings, five inches and three quarters.

So uncommonly bright and brilliant is this superb insect, that it can be but faintly expressed by the utmost efforts of artificial colouring, and may serve as an instance, amongst many others, of the inimitable beauty which Nature alone can produce.

Linnæus, in his description of this splendid insect, *observes, that* the blue on the upper surface is so *polished* and lively, that scarcely any other natural



20.

THE SILVER-BLUE BUTTERFLY.

Papilio Menelaus.—SOUTH AMERICA.



object can come in competition with it. On the contrary, the under surface of the same animal exhibits an example of a species of beauty, resulting from a varied combination of the plainest and most sober colours, the ground colour being brown, slightly streaked with higher shades, and marked by several very large ocellated ferruginous spots, with dark rings and white pupils.

Dr Shaw says,—"If it were not almost bordering on temerity to attempt a reason for this striking difference between the two surfaces of the same insect, one might suppose that this sobriety of colouring on the lower side, is intended, in some measure, to secure the animal, when sitting at rest with its wings closed, from the depredations of birds, which are less likely to be attracted in this state, than by the full lustre of its expanded plumage."

It is a native of South America; the caterpillar is very large, and of a yellow colour, thickly beset with black spines.

THE EMPEROR OF THE WOODS, OR PURPLE HIGHFLIER.

Papilio Iris.—BRITAIN.

PLATE XXI.

Papilio Iris, *Linn. Syst. Nat.* p. 476.—*Harris's Aurelian*, p. 5. pl. 3.—*Shaw's Nat. Miscel.* pl. 862.

THE antennæ are club-shaped; the wings are indented, purple above, changing to brown in different lights; they are darker round the edges, the depth of tone being nearly black; the upper wings have seven distinct white spots, the largest of which is triangular, which joins to a sesquialterous white band, crossing them in a diagonal direction; in the centre of the lower half is an annulet of bright orange, with an internal ring of black and white in the centre; the head and body are dark raw umber brown; the eyes orange; the whole under surface of the insect is black, brown, and white.

The *Papilio Iris* is esteemed among the most beautiful, and placed with the rare of the British Lepidoptera. The cursory reader may not perceive that superiority, particularly as many of the minute insects infinitely excel it in real beauty and richness *of colouring*; but the scientific will be ever ready *to give it* the first place as a British Butterfly.



21.

THE EMPEROR OF THE WOODS, OR PURPLE HIGHFLIER.

Papilio Iris.—BRITAIN.



It derives the title of Purple Highflier from the circumstance of its very rarely descending to the ground; except in some few instances, having hitherto been only captured in elevated situations; and even those instances have been after a strong wind or heavy fall of rain. The tops of the loftiest forest trees afford it an asylum; and in the caterpillar and chrysalis state, it is preserved from the wanton cruelty of man, by the almost inaccessible height of its habitation. The larvæ feed on the sallow, (*Salix caprea.*) They are obtained by beating the branches of the tree with a pole twenty or thirty feet in length; in which case it is a necessary precaution to cover the ground beneath with large sheets, to a certain distance, lest the larvæ should fall and be lost among the herbage.

The caterpillar is hatched about the end of May or beginning of June; and early in July it passes to the chrysalis condition; and undergoes its final change into the imago, or perfect butterfly, in the end of that month, or in the beginning of August.

The great difficulty and trouble in rearing the caterpillar of this *Papilio,* even after it has been found, and the still greater difficulty of taking the butterfly, has stamped a valuable consideration on it, and particularly so when the colours are bright, and the insect in a perfect condition; and, therefore, a high price is obtained for it when in a good state of preservation. The male is smaller, but

hand, Nature has, to a certain extent, comp
for this in the female, as the under side of he
are far richer, in the various tints of colou
those of the male. They are both bea
spotted, mottled, and covered with brown,
white, and orange. The chrysalis is of a v
licate texture, much resembling the whit
and is tinged in several parts with a ver
purple hue, which is transmitted from the
the enclosed insect, and bears the chara
mark of a *Papilio*, by being suspended fr
tail, with the head downward.



22.

THE PLANTAIN FRITILLARY.

Papilio Cinxia.—Britain.

THE PLANTAIN FRITILLARY.

Papilio Cinxia.—BRITAIN.

PLATE XXII.

Papilio Cinxia, *Linn. Syst. Nat.* ii. p. 784, No. 205.—*Wilk's Pap.* 58, tab. 3, *a.* 8.—*Donovan's Brit. Ins.* pl. 242.

THE wings are indented, and of a bright chestnut brown colour, clouded with black; the margin with a row of oblong white spots; the under side is fulvous, with three whitish bands across the lower wings, marked with black spots.

The larva is black, beset with spines and tufts of the same colour. The sides are marked with a double row of white spots; and the feet are red. It is found on the long plantain in April. It becomes the perfect insect in May. This is the rarest of the British Fritillary Butterflies, if we except the *Papilio Lathonia*, the Queen of Spain Butterfly.

THE ARCHIPPUS BUTTERFLY.

Papilio Archippus.—AMERICA.

PLATE XXIII.

Papilio Archippus, *Fabr. Ent.* iv. p. 49.—*Cramer, Desc. de Papillons*, pl. 206, fig. 8, E. F.

THE centre of all the wings is deep fulvous brown, surrounded by a black band, which is thickly studded with irregularly shaped white spots and dots. At the outer extremity of the upper wings there are two large oblong fulvous spots, and several others of yellow and purple. The body is black, and dotted with white on the back.

The extent of this insect is four inches and an eighth. The antennæ are rather short and slender for the size of the butterfly. It inhabits Carolina and Virginia.

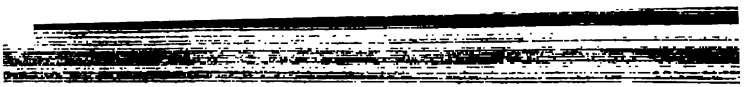
The caterpillar is white, with transverse bars of dark brown. It feeds chiefly on the leaves of the *Asclepias carassavica*. The pupa is of a pale green, with several bright golden yellow spots.



23.

THE ARCHIPPUS BUTTERFLY.

Papilio Archippus.—AMERICA.







24.

THE PERANTHUS BUTT

Papilio Peranthus.—Coc

THE PERANTHUS BUTTERFLY.

Papilio Peranthus.—Cochin China.

PLATE XXIV.

Papilio Peranthus, *Gmelin's Linné, p.* 2232.—*Shaw's Nat. Misc.* pl. 512, fig. 2.

The upper and under wings of this insect are black, with an area of yellow green around the body, and a macular band of transverse oblong-ovate olive green spots in the centre of the black, on the upper wings, which are entire. The lower wings are considerably scalloped, or indented, with two broad caudate wings. The body, head, and eyes are black; and the antennæ are short, in proportion to the size of the insect, which measures nearly four inches and three quarters in breadth.

This insect inhabits Cochin China, and is more remarkable for the singularity of its general form, than for its beauty. It is exceedingly clumsy and heavy in its appearance.

THE SWALLOW-TAIL BUTTERFLY.

Papilio Machaon.—BRITAIN.

PLATE XXV.

Papilio Machaon, *Linn. Syst. Nat.* ii. p. 750, No. 33.—*Wilk's Pap.* tab. 47, fig. 1, *a.* 1.—*Donovan's Brit.* [illegible] pl. 209.



THE upper surface of the wings is of a fine [illegible] straw yellow. Upper wings long in proportion to the under ones, measuring three inches and seven twelfths; their whole exterior margins are furnished with a broad black border, having near its outer edge a double row of longitudinal spots of the same colour as the wings, within which, on the upper wings, are corresponding fasciculi of small dots. Towards the external margin are two large oblong patches of black, in the middle of which are blotches of azure blue. Under wings considerably indented; in place of the bundles of dots, are corresponding blotches of azure blue; and at the anterior angle of the lower wing, on the border, is a scarlet circular spot.

The body is black, blue in the centre, having a longitudinal central line, extending nearly to the point of the tail.

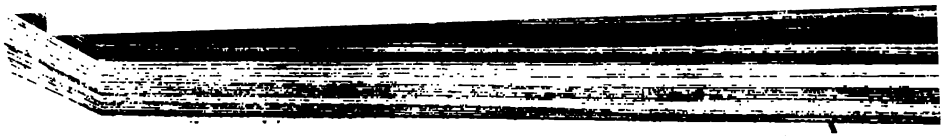
This Papilio and the Papilio podalirius, are the



25.

THE SWALLOW-TAIL BUTTERFLY.

Papilio Machaon.—BRITAIN.



only two species of Swallow-tail Butterflies that have yet been found in Britain. Both are very scarce; but the present less so than its congener. The caterpillar is smooth pale green, with black red-spotted rings. The chrysalis is of a yellowish green colour. Harris says it feeds on wild fennel and carrots in July and September. He mentions that one he found, remained in the chrysalis state from the 23d September till the 15th May following; and another, that changed July 14th, produced a butterfly on the 10th of August. He adds, that the species was found in the meadows of Bristol and Westram. It also inhabits Kent, Norfolk, Hants, and Cambridge.

This insect is common on the Continent of Europe.

THE CAMBERWELL BEAUTY.

Papilio Antiopa.—BRITAIN.

PLATE XXVI.

Papilio Antiopa, *Linn. Syst. Nat.* ii. p. 776, No. 169.—Maxima Nigra, *Wilk's Pap.* 58, tab. 2, *a.* 10.

THE wings are angulated, of a rich purplish brown, with a pale straw-coloured exterior marginal border, within which is a fillet of black, with a row of equidistant blue eyes in the middle; on the anterior margin of the upper wings are two straw-coloured spots, and nearer the body a double row of little punctated spots of the same colour. The body is burnt umber brown, the eyes scarlet, and the antennæ claviform. The under side of the butterfly is of a blackish brown, with irregular dark streaks. The yellowish border is visible on that side.

This beautiful insect is found in every part of Europe. In Germany in particular it is very common; and no less frequent in America. Britain is the only country where it is esteemed a rarity, although some seasons it is found abundantly in England; but its appearance is neither annual nor periodical; hence its value by English collectors.

There have been several instances of this insect *being* found in different parts of the country in mild



26.

THE CAMBERWELL BEAUTY.

Papilio Antiopa.—BRITAIN.

seasons, as plentifully as the Peacock or Admirable Butterflies; in the summer of 1793, in particular, they were in some places as numerous as the common White Butterfly.

But, as a proof that its appearance does not altogether depend upon the temperature of the weather, there have been many of our hottest seasons, which are most favourable to the propagation of all kinds of insects, in which not a single specimen of the Camberwell Beauty was to be met with.

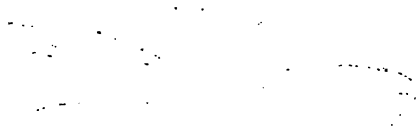
It is from the uncertainty of the appearance of this *Papilio*, that we have such varied accounts of its scarcity and abundance. It must have been long known to the British lepidopterist; yet it received the name of Grand Surprise from Harris, or some of the Compa- v of Aurelians, of whose society he was a member. This name was evidently intended as a significant expression of their admiration, not of the beauty of the insect, but of the singular circumstance of the species remaining so long in those very places where the most diligent researches of preceding collectors had been made in vain. Of their unwearied industry they were well persuaded; and were, therefore, unable to account for the appearance of a numerous brood of large insects, which must have remained concealed many years, or been lately *transported to* those places.

Harris, in his Aurelian, calls it the Camberwe*Beauty; and, in his list of English Butterfli*

Hawk Moths, and Moths, he uses the name *Grand Surprise*. We mention this circumstance, as it appears very inconsistent, that he should make use of these two names indiscriminately in the several editions of both works. We still find it, in the *Aurelian*, Camberwell Beauty, and in the other, Grand Surprise; from which it might readily be inferred, that he meant two distinct insects, were it not for the addition of the Linnæan name, *Papilio Antiopa*.

The English specimens differ from those of other countries, in the colour of the light exterior border of the wings. In the former, that part is very pale straw yellow, or, in some instances, inclining to dirty white. In the latter, it is of a deep yellow, marked and spotted with brown. Fabricius, who notices this, says they are varieties; but this variation we consider the result of local habitation alone.

The caterpillars feed on the willow; and are generally found on the highest branches of the tree. They change from this state to that of the chrysalis, in July.





27.

THE BRIMSTONE BUTTERFLY.
Papilio Rhamni.—BRITAIN.

THE BRIMSTONE BUTTERFLY.

Papilio Rhamni.

PLATE XXVII.

Papilio Rhamni, *Linn. Syst. Nat.* ii. 765, No. 106.—*Donovan's Brit. Ins.* pl. 145.—Gonepteryx Rhamni, *Lat.*

THE wings are angulated, sharp at the dimidiate margin; the colour, a bright sulphur yellow, with a small crimson spot in the centre of each; the head and antennæ deep crimson, the eyes and body bluish gray; the under side pale yellow, the exterior margin being of a deeper colour, with equidistant small spots of pink; centre of the wings, with pale crimson spots.

The Brimstone Butterfly is common in many places in the month of June. In its caterpillar state, it is very seldom taken; and when in the chrysalis condition, it is generally so concealed among the herbage, that it is almost impossible to be discovered, from its green colour according so well with the surrounding leaves. In this state it is suspended by the tail; but has such muscular strength, that if touched, it can throw itself upright immediately, in the same manner as the pupa of the *Phalæna pentadactyla*. The caterpillar feeds chiefly on buckthorn, whence it has received the specific name of Rhamni.

The male alone is of a vivid yellow. The female is of a dull greenish white.

THE MAZARINE-BLUE BUTTERFLY.

Papilio Arion.

PLATE XXVIII.

Papilio Arion, *Linn. Syst. Nat.* ii. p. 789, No. 230.—*Donovan's Brit. Ins.* pl. 184.

THE whole upper surface of this insect is of a fir deep blue. The exterior margin in both wings h a border of deep black; the upper wings a row equidistant, and the under ones a row of triangula blue spots. On the centre of each wing is a lunate black spot, betwixt which and the border on t upper wings is a row of four oval black spots, a on the lower wings, under the lunated spot, i row of similar shaped black spots, six in numl On the outside of the black border, is a very nar edge of white, which is fringed. The body is ple above; and the whole under surface of the ir is pale brown, studded thickly with black spot

The Mazarine Blue Butterfly is a very s insect in this country; and it does not appear much more common in any other part of E We are as yet totally ignorant of its larva.



28.

THE MAZARINE-BLUE BUTTERFLY.

Papilio Arion.—Britain.





29.

THE BOLINA BUTTERFLY.

Papilio Bolina.—AMBOYNA.

THE BOLINA BUTTERFLY.

Papilio Bolina.

PLATE XXIX.

Papilio Bolina, *Cramer, Desc. de Papillons*, pl. 205, fig. A. B. —*Shaw's Nat. Misc.* pl. 955.

THE wings are of an intense black, denticulated with a vandyked border of white. On each side of the wings is a large, circular, violet spot, softening into white in the centre. The upper wings have, besides, two pale blue spots towards their extreme points. The body is peach colour; the head is black, with four eyelet spots; and the eyes are scarlet. The antennæ are long and slender. The under surface is variously clouded, streaked, and mottled with black, brown, orange, and blue. The extent of the wings is four inches.

The Bolina Butterfly inhabits the island of Amboyna. There are several varieties of this insect.

THE BROWN HAIR-STREAK BUTTERFLY.

Papilio Betulæ.

PLATE XXX.

Papilio Betulæ, *Linn. Syst. Nat.* ii. 220.—*Donovan's B Ins.* pl. 250.—Hisperia Betulæ, *Fabricius Entom. S* 1070.

The wings and body are of a beautiful, hi toned, reddish brown, with a large semilunate pa of rich orange on the upper wings, slightly clou with brown on its upper disc. The lower wi are furnished with short caudate wing appenda of a bright orange colour. The under surface of wings and body is of a fulvous colour, the up wings having a border of dark brown in their terior margin; also, a large sesquialterous band, a circular spot of dark ash colour, surrounded b white margin. The lower wings have two l sesquialterous fasciæ, extending nearly across t centre.

The male of this species is distinguished by *orange* spot on the upper wings, the female be *devoid* of it. The larva is remarkable on accou *its being* so broad and flat. It is of a dull streaked, with a row of short hairs extendin



30.

THE BROWN HAIR-STREAK BUTTERFLY.

Papilio Betulæ.—BRITAIN.



ıck. It is found in the months of May and June e alder and sloe, on which it feeds; and changes e chrysalis condition in the first week in July. pupa is of a burnt umber-brown colour, and ɣes to the perfect insect in August.

THE CASSIA BUTTERFLY.

Papilio Cassiæ.

PLATE XXXI.

Papilio Cassiæ, *Shaw's Nat. Misc.* pl. 791.

THE upper surface of the wings is of a bri cinnamon brown, and considerably indented, wit broad, scalloped, sesquialterous, bright golden-yell band, traversing both the upper and lower wir At the exterior margin, it is of a deep saffron, golden-yellow, gradually softening into the prev ing tint. The body is of the same colour as wings. On the upper wings, towards their tips two pale blue roundish spots. This *Papilio* sures four inches and a half in breadth. The c pillar is large, being three inches in length. It a pale willow-green above, with transverse bands. A longitudinal fillet of blue extends the head to the tail, banded on each side by cri beneath which is another longitudinal band yellow, bounded on its lower extremity by a *band.* The belly is deep olive green. The *green,* furnished with two ciliated appendag *antennæ,* and two hooked teeth-like proce *the coronal* surface, are three upright hor [illegible] crimson. The tail has two



31.

THE CASSIA BUTTERFLY.

Papilio Cassiæ.—SURINAM.



ɔendages. This caterpillar feeds on the different igs of the cassia tree, and changes to the chrysalis the month of May. It is an inhabitant of Suri-n.

The chrysalis is two inches long, beautifully ıded with brown, pink, and cinnamon.

The Cassia Butterfly emerges from the chrysalis June, and may be regarded as one of the prettiest .ts species, from the richness and harmony of its ɔurs.

THE DEIPHOBUS BUTTERFLY.

Papilio Deiphobus.

PLATE XXXII.

Papilio Deiphobus, *Linn. Syst. Nat.* p. 744.—*Cramer, Desc. de Papillons*, i. p. 64, pl. 40.—*Shaw's Nat. Misc.* pl. 540.

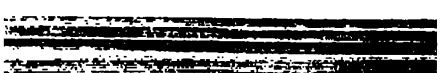
The upper wings are deep brownish black, slightly indented, and marked with two acute triangular patches of crimson on the shoulders. The lower wings are deeply indented, and clouded with white, crimson, and black; furnished with two large caudate wings. The body, head, and eyes are black. The antennæ are rather slender, with large knobs at their tips.

This insect measures six inches and a half in breadth. It inhabits India. The different specimens are observed to vary occasionally in their colours.



32.

THE DEIPHOBUS BUTTERFLY.
Papilio Deiphobus.—INDIA.





33.

THE CHALK-HILL BLUE BUTTERFLY.

Papilio Corydon.—BRITAIN.

THE CHALK-HILL BLUE BUTTERFLY.

Papilio Corydon.

PLATE XXXIII.

Papilio Corydon, *Donovan's Brit. Insects*, pl. 236.—Hesperia Corydon, *Fabricius, Ento. Syst.* iii.

THE whole upper surface of the wings and body of this butterfly are of a pale silvery blue, with a broad, black, fringed margin; that of the lower wings with a row of central equidistant blue rings, or eye-like spots. The under surface of the insect is of a grayish brown, with a black margin, having a double row of white spots in the centre. All the other parts of the wings are ocellated.

This is an exceedingly local British butterfly, and has only been found on the Chalk Hills, between Dartford and Rochester, particularly on a long range of hillocks, leading from Dartford to the wood of Parent-Home. This butterfly has been called the Chalk-Hill Blue Butterfly, from the locality where it has been found. We believe it has not been detected in any other part near London. The larva is unknown. It appears in its winged state in the first second week of July.

The female is brown above, with sometimes a tinge of blue near the base of the wings, edged with yellow spots; under side generally darker than the male, and the spots more distant.

THE PHORCAS BUTTERFL

Papilio Phorcas.

PLATE XXXIV.

Papilio Phorcas, *Gmelin's Linn. Syst. Na*
Cramer, Desc. de Papillons, i. pl. 2, f

THE upper surface of the wings, the
and eyes of this *Papilio*, are black. A
of a bright green runs through the ce
upper and under wings, the latter of
furnished with caudate wings, and macu
green, about an eighth of an inch from th
the upper wings have a large and smal
near their points. The under side of
the same as the upper, but paler in the

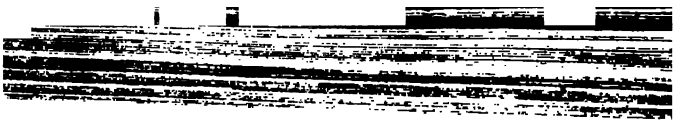
This is a fine insect; it is a native of
is said to be not uncommon at Sierra
measures four inches in length.



34.

THE PHORCAS BUTTERFLY.

Papilio Phorcas.—SIERRA LEONE.





35.

THE MARBLED BUTTERFLY.

Papilio Marmorea.—BRITAIN.

THE MARBLED BUTTERFLY.

Papilio Marmorea.

PLATE XXXV.

The Marmoreas, *Harris' Aurelian*, pl. 11. fig. K.—Hipparchia Galathea of Latreille.

THE upper surface of the wings are black, beautifully marked with various shaped spots of white and yellow; there is a belt of white and black square spots surrounding the posterior margins of both wings, and on the lower one are two annulated eye-like spots.

The eggs of this insect are dropped separately amongst grass, and are of a yellowish colour when first deposited, but become afterwards of a clear white.

The caterpillar feeds on grass, and lives through the winter. It gets full fed in the beginning of June, and then changes into a chrysalis; in which condition it remains twenty days, when it emerges the perfect butterfly.

The female differs considerably from the male, the lower wings being of a tawny orange colour.

Although there is but little variety of colour in this insect, yet it is very beautiful, and may be

considered as one of the most interesting lepidopterous insects.*

* Professor Rennie says, that a species of mi (*Leptus phalangii* of De Geer,) infests this insect; particularly remarked it in the year 1830, at Havre So thickly studded were some of the poor animals troublesome parasites, that they were hardly able to the exhaustion caused by the little bloodsuckers; and tinaciously did they maintain their hold, that several adhered to the Papilios even after they were placed in th fessor's cabinet. It is a remarkable circumstance, that alt the Ringlet Butterfly, (*Hipparchia hyperanthus,*) was abundant at the same time, and their food and habits similar to those of the *Galathea*, not one of the parasites to be found in some hundreds which he caught expresly the purpose of ascertaining the fact.† The common Humb Bee is infested by a parasitic mite, which often proves the caus of its death; but it has been observed, that, differently from the mites above mentioned, they always quit the bee before death, or at least the instant it dies.

† *Insect Trans.* p. 28.

[redacted]



36.

THE PURPLE HAIR-STREAK BUTTERFLY.

Papilio Quercus.—BRITAIN.

THE PURPLE HAIR-STREAK BUTTERFLY.

Papilio Quercus.

PLATE XXXVI.

Papilio Quercus, *Gmelin's Linn. Sys. Nat.* i. p. 2341.—*Donovan's Brit. Ins.* pl. 460.—Hesperia Quercus, *Fabricius, Sp. Hist.* ii. p. 118, No. 527.

THE wings are of a deep bistre brown, the upper ones having a large triangular patch of bright blue towards their junction with the body; the posterior margins of both wings are of a pale fawn colour, and fringed; the lower wings have small caudate wings; the under surface is of an ash colour, with three macular bands, and an eye-like spot of rich green near the lower angle of the under wings; the body is bright yellow beneath.

The female has no patch of blue on her upper wings, and differs, in the colour being more inclined to purple, than it is in the male.

The larva is very fat, of a beautiful rosy colour, with a yellow stripe along its sides, and in the middle of each annulation is a minute round dot of green; the lower surface is also yellow. It feeds on the oak, and is to be found in the caterpillar state in June. The chrysalis is glossy, of a ferruginous colour, with three dorsal lines of brown dots; it changes to the *perfect butterfly* condition in July.



Papilio Helena, *Linn. Syst. Nat.* p. 748.—*Cr de Papillons*, pl. 22. f. 1.—*Shaw's Nat.* pl. 77.

ALL the wings of the Helena are l alternate radiations, rendered visible b of light; the upper wings are very slightl and the lower ones considerably so, w patch of bright golden yellow on each; light burnt umber brown; the antennæ short and slender, with pretty large kn tips.

The *Papilio Helena* is a South Amer and principally found in Surinam. It is as one of the most striking of the exotic



37.

THE BLACK AND GOLD BUTTERFLY.

Papilio Helena.—SURINAM.





38.

THE CÆRULEAN BUTTERFLY.

Papilio Cærulea.—Female.—BRITAIN.

THE CÆRULEAN BUTTERFLY.

Papilio Cærulea.

PLATE XXXVIII.

Papilio Argus, *Harris' Aurelian*, p. 75, pl. 39, fig. i.—*Linn. Syst. Nat.* p. 789.—Polyommatus Argus, *Latreille.*

THE wings of the Cærulean Butterfly are of a deep azure blue, as also the body; the under wings have a very broad band of dull crimson at their lower margin, which reaches nearly to their centre; this band is spotted with circular and triangular black dots; the whole posterior margins of both wings are surrounded by a white edge.

The female differs considerably from the male, the upper side being of a dark brown colour.

The under side of the wings are handsomely bordered with eye-like spots; the other parts of the wings are of an ash colour, besprinkled all over with small ocellated spots, or circles.

This butterfly emerges from its chrysalis about the beginning of June. It is found in several parts of Britain, but not in great abundance.

THE APOLLO BUTTERFLY.

Papilio Apollo.

PLATE XXXIX.

Papilio Apollo, *Linn. F. Suec.* 1032.—*Haworth's Lep. Brit.* i. p. 29.—*Donovan's Brit. Ins.* pl. 433.

The wings are slightly indented, of a fine pale straw colour; the upper ones having large black spots, with a macular band of semilunate clusters of dots, which also extend over the under wings; the lower ones have four large annulets of bright scarlet, white in the centre, and surrounded by black, with a brown double lunated spot towards their inner margin; the body is black above, and brown beneath; the annulets are the same below as above; and there are a row of four large scarlet spots on each side of the body; and a double sesquialterous scarlet spot, with a white one in its centre.

The Papilio Apollo is the offspring of a solitary sluggish larva, of a black colour, covered with a soft silky down. All the wings are marked on both sides with two red spots, which together constitute a longitudinal series along each side. Besides these spots, *every* segment is marked nearer the middle of the *back* with three small lateral dots of a bluish colour, *disposed* in a semilunar manner, and thus forming



39.

THE APOLLO BUTTERFLY.

Papilio Apollo.—BRITAIN.



a longitudinal waved line on each side within the two rows of red spots. The anterior part of the head is furnished with tentacula, furcated when completely spread out, and which the animal can advance or retract at pleasure. The pupa is slightly folliculate, somewhat ovate, and of a bluish colour.

This large and beautiful butterfly is an inhabitant of various parts of Europe, and is found also in the more temperate parts of Siberia. It is inserted among the British Papiliones, on the authority of Mr Haworth.

THE FORKED BUTTERFLY.

Papilio Furcillata.

PLATE XL.

Vanessa furcillata, *Say's American Entomology*, vol. ii. pl. 27.

THE wings are angular, with a common fulvous band, and two fulvous spots on the superior ones; beneath, brown, with black lineations. The superior wings are black above, with a broad fulvous sub-marginal band, which is bifid at the costal margin, having the exterior division terminated by a white spot, and the inner division by a pale yellow one; between the band and the base of the wing are two fulvous transverse spots; costal rib near the base with yellow variegations; inferior wings black above, with a broad fulvous sub-marginal band, and on the black margin is a series of six or seven small sub-lunate purplish ophalescent spots; all the wings beneath are blackish, and very numerous transverse blacker lineations, some of which are undulated, and deep velvet black; a common pale brownish sub-marginal band, also with the blackish lineations; the antennæ are yellow at the tip of the club; venter, dull whitish.

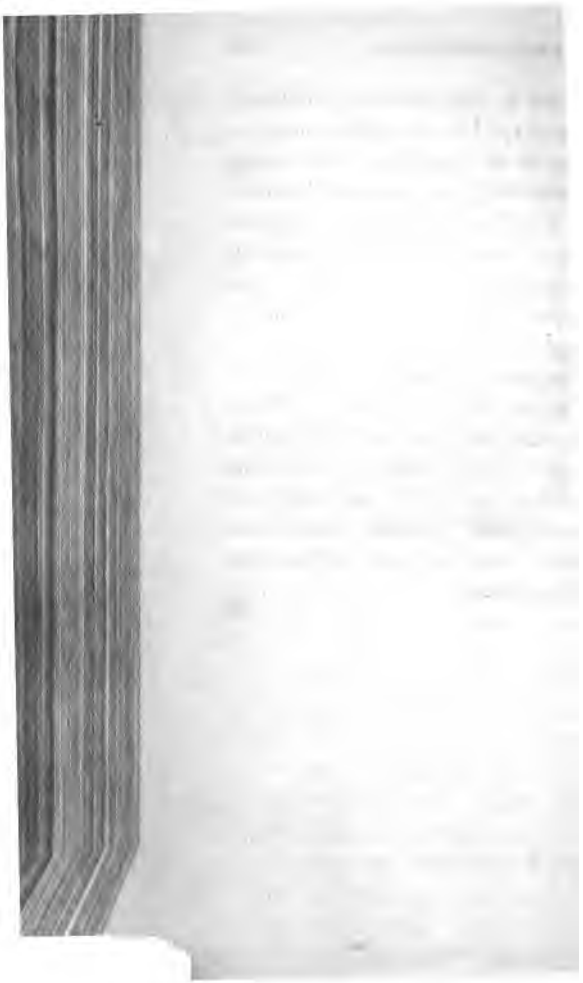
This pretty species of butterfly was observed by



40.

THE FORKED BUTTERFLY.

Papilio Furcillata.—UNITED STATES.



Mr Say several times in the north-west territory, during the progress of the late expedition under the command of Major S. H. Long, over that region. In the vicinity of Fort William, an establishment of the Hudson Bay Fur Company, it frequently occurred in the month of September, whilst the party remained at that place. It is closely allied to the *Polychloras* and *Urtica* of Europe, but is sufficiently distinct from either.

The larvæ of the genus *Vanessa* live on plants of little altitude, and are often gregarious; they are armed with numerous, long, rigid, dentated spines, which, like the quills of the hedgehog, constitute their only defensive weapons. The chrysalids are attached to a fixed object by the tail, and in this reverse posture quietly wait the period of their final emancipation and perfection.

THE LARGE WHITE CABBAGE BUTTERFLY.

Papilio Brassicæ.

PLATE XLI.

Papilio Brassicæ, *Linn. Syst. Nat.* ii. p. 759, No. 75. *Donovan's Brit. Ins.* pl. 446.—Pontia Brassicæ, *Latreille.*

THE wings are rounded and entire, of a pale yellowish white; the posterior margins fringed; the upper wings have a large patch of black at their tips, and three large black spots, the higher ones being near the centre, and the other beneath; the lower wings have a single black spot in the centre of their anterior edge; the female marked with two black spots; the body is black above, and yellow underneath.

The larva is of an ashen-gray above, and cream colour beneath, with a central line of yellow down its back, the colour of its back and belly being divided by a yellow line; the head is black; the whole upper surface is thickly speckled with irregular punctated black dots.

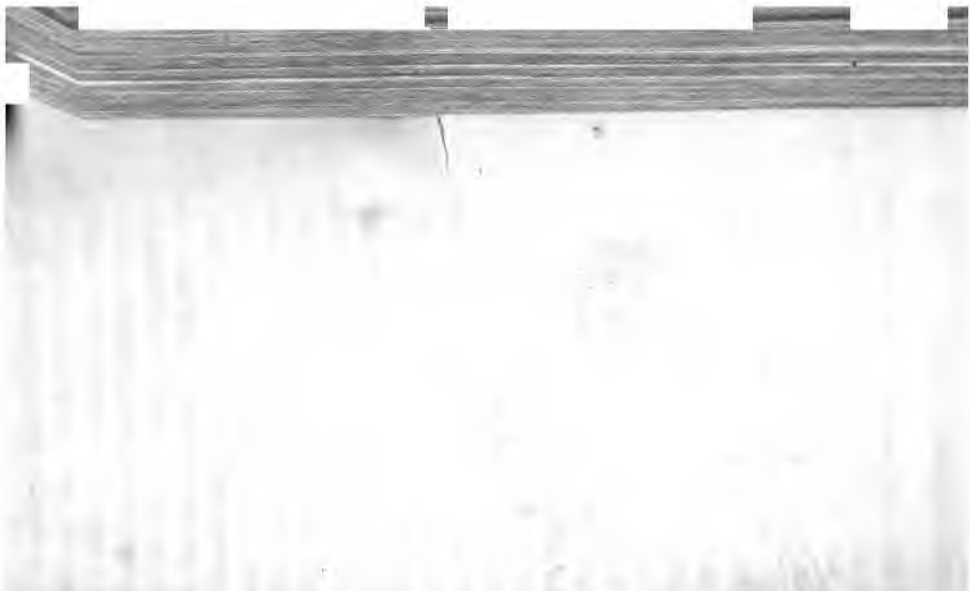
In dry seasons, favourable to the growth and increase of these pernicious insects, the larvæ become very injurious to our gardens, and would be *infinitely* more so, were it not for the number of



41.

THE LARGE WHITE GARDEN BUTTERFLY.

Papilio Brassicæ.—BRITAIN.



small birds which prey upon them, and thus lend their friendly aid to destroy these rapacious intruders. They feed, for the most part, on cabbages, and some other of our culinary plants, which renders them more injurious to the kitchen-garden than any other. We have seen a garden with many hundreds of cabbages completely devoured by these caterpillars. They are of the number of those known in England by the trivial name of grub, and in the perfect or winged state they are distinguished by the less ambiguous epithet of Large Cabbage Butterfly.

From the astonishing fecundity of these insects, it may be wondered that they do not, in the course of time, completely overspread the face of the earth, and totally consume every green plant. This would certainly be the case, if the Omnipotent had not put a check to their progress. There is a genus of little insects, called by naturalists the *Ichneumon*, which always oviposits within the body of other insects, or in their larva or pupa. Different species have assigned to them particular insects, and the parent Ichneumon will lay her eggs nowhere else; she searches for these caterpillars with unremitting assiduity, till she is successful. Within these caterpillars the eggs are deposited, and are hatched; there they continue during their larva state, preying upon the vitals of the animal; they pass to the pupa condition, and eventually emerge the *perfect insects*. Some idea may be formed of the

service rendered to makind by these Ichneu
which prey upon noxious larva, from the
that out of thirty individuals of the common
bage Caterpillar which Reaumur put into a
to feed, twenty-five were fatally pierced b
Ichneumon globatus, which had totally
med their intestines.* I do not, however, giv
as an average of the numbers destroyed by
means. The following interesting observatio
the Rev. Mr Bree, which are of a recent date
serve to show the more probable numbers
suffer by this means:—"Towards the end of
last,† I observed a brood of the caterpillars of
tia brasicæ, amounting in number to twenty
feeding on the cabbages in my garden. I
them in confinement; and, as they were near
grown, they soon commenced preparing for
transformations. By the first of July, nine
the twenty-four had turned to the chrysalis
and the remaining fifteen produced the silken
ters of pupæ of *Microgaster glomoratus*. I m
this circumstance, not at all under the idea
being any thing new or extraordinary; for
aware, on the contrary, that it is one of ever
occurrence, and my object is to arrest the att
to the enormous extent to which the destruct
Pontia brassicæ is effected by the Micro
Nine caterpillars only, out of the twenty

* Reaumur, ii. p. 419. † 1831.

came to maturity as butterflies; the remaining fifteen (*i. e.* nearly two-thirds) were destroyed by the parasite. Now, if the present instance is to be taken as a fair average example of what usually occurs, (and I see no reason why it may not,) we should have had this season, were it not for the ravages committed by the Microgaster, almost two-thirds more of this already very abundant butterfly than we now have. In the course of a few seasons, supposing no other 'preventive check' to come into operation, the Cabbage Butterfly would increase in a kind of geometrical proportion; our gardens would soon be absolutely devoured and laid waste by the caterpillars; and it would scarcely be possible to walk abroad without being smothered by the winged insects. So greatly are we indebted to this apparently contemptible little parasite, (whose operations are unheeded by all but naturalists, and of whose very existence the generality are perhaps scarcely aware,) for keeping down the increase of an insect, which would otherwise become a serious and alarming evil.

"I may observe, that, though the Cabbage Butterflies did not come forth from the chrysalis till July 18th to 20th, the silken pupæ of Microgaster produced swarms of the winged insects by *the 12th, ready* to go forth and commence their *destructive operations* on fresh broods of caterpillars.

"*The Cabbage* Butterfly appeared to me to be

unusually abundant, between London and Dartford, the first week in August; I observed them even hovering about the stalls and green grocers' shops in the outskirts of London, attracted, no doubt, by the cabbages and other vegetables exposed for sale.

"Subsequent observation induces me to believe, that I have by no means overrated the ravages of the Microgaster, but that what is stated above, may be considered as no more than an average example of its destructive powers. The chalk cliffs at Dover abound with the wild cabbage, (*Brassica oleracea*,) which, as might be expected, affords food to an immense number of the Cabbage Caterpillars; and, accordingly, the butterfly is exceedingly abundant in that neighbourhood. The latter end of September I saw many caterpillars creeping about the cliffs, and undergoing their transformations. I remarked, that those which were infected by the Microgaster, far exceeded in number those which would arrive at the chrysalis state. I have also had occasion to make the same remark at Matcham, in Surrey. I may add, that on the 25th of September, I observed at Dover many specimens of Microgaster in the winged state, adhering to the pupa, from which they appeared to have just emerged; and the same also at Matcham, on the 8th of October. The flies *thus* produced at this late season of the year, would, *no doubt*, attack the later broods of Cabbage Cater-

pillars, which are often to be met with so late as the end of October, or even in November. The large and continuous supply of this little parasite throughout the summer and autumn, so long as its services are required, is one of those wise and beneficent provisions, which cannot but excite our admiration." *

If we compare the myriads of caterpillars that often attack our cabbages and brocoli, with the small number, comparatively, of butterflies of this species that usually appear, we may conjecture that they are commonly destroyed in some such proportion,—a circumstance that will lead us thankfully to acknowledge the goodness of Providence, in providing such a check to prevent the total destruction of some of our most useful and esteemed culinary plants.

The larva of the Large Cabbage Butterfly appears in spring, and, indeed, throughout the greater part of the summer, as there are two or more broods every year.

The chrysalis is of a rich yellow, clouded with gray, and speckled with crimson dots.

The appearance of the Large Cabbage Butterfly on the wing, in a morning, is considered generally as an unerring prognostic that the weather will *clear up*, and the day eventually prove fine.

* *London's Magazine of Natural History*, No. XXIV for January 1832, page 107.

The caterpillars of the Cabbage Butterfly, like various other species, have a particular mode of climbing, which is either by a sort of ladder or single rope of their own construction. There are few persons who have lived in the country but must have noticed the larva of this insect climbing up a wall, or over the glass of a window. If this process is closely observed, on the square which the animal is traversing, it will be noticed, that the creature leaves a visible tract behind it, like a snail. If this is examined with a microscope, it will be seen that it consists of little silken threads, which it has spun in a zigzag direction, forming a rope-ladder, by which it ascends a surface it could not otherwise adhere to. The silk which comes from these spinners is a gummy fluid, which hardens in the air, so that they have no difficulty in making it stick to the glass.

Many caterpillars that feed upon trees, particularly the Geometers, have often occasion to descend from branch to branch, and sometimes to the ground—especially previous to their assuming the pupa condition. Had they to descend by the trunk, supposing them able to traverse with ease its rugged bark, what a circuitous route must they take before they accomplish their purpose! Providence, watchful over the welfare of the most insignificant of its creatures, has gifted them with the means of attaining these ends, without all this labor

loss of time. From their own internal stores, they can let down a rope, and prolong it indefinitely, which will enable them to travel where they please. Shake the branches of an oak, or other tree, in summer, and its inhabitants of this description, whether they are reposing, moving, or feeding, will immediately cast themselves from the leaves on which they are stationed; and, however sudden the attack, they are nevertheless provided for it, and will all descend by means of the silken cord alluded to, and hang suspended in the air. Their name, Geometer, was given them because they seem to measure the surface they pass over, as they walk with a chain. If one is placed on the hand, it will be felt to draw a thread as it moves. When they move, their head is extended as far as they can reach with it; then, fastening their thread there, and bringing up the rest of their body, they take another step, never moving without leaving the clue behind them, the object of which, however, is neither to measure nor to mark its path that it may find it again, but thus, whenever the caterpillar falls, or would descend from a leaf, it has a cord always ready to support it in the air, by lengthening which, it can with ease reach the ground. Thus it can drop itself without danger from the summit of the most lofty trees, and ascend again by the same method. As the silky matter *is fluid when* it issues from the spinners, it should

seem as if the weight of the insect would be too great, and its descent too rapid, so as to cause it to fall with violence upon the earth. The little animal knows how to prevent such an accident, by descending gradually. It drops itself a foot, or half a foot, or less, at a time, then, making a longer or shorter pause, as best suits it, it reaches the ground at last without a shock. From hence it appears, that these larvæ have power to contract the orifice of the spinners, so that more of the silky gum shall issue from it, and to relax it again when they intend to resume their motion downwards; consequently there must be a muscular apparatus to enable them to effect this, or at least a kind of sphincter, which, pressing the silk, can prevent its exit. From hence it also appears, that the gummy fluid which forms the thread must have gained a degree of consistence even before it leaves the spinner, since, as soon as it emerges, it can support the weight of the caterpillar. In ascending, the animal seizes the thread with its jaws, as high as it can reach it; and then, elevating that part of the back that corresponds with the six perfect legs, till these legs become higher than the head, with one of the last pair it catches the thread, from this the other receives it, and so a step is gained; and thus it proceeds till it has ascended to the point where it wishes to reach. At this time, if taken, it will be found to have a packet of thread, from which, however, it soon dis-

engages itself, between the two last pair of perfect legs.* To see hundreds of these little animals pendent at the same time from the boughs of a tree, suspended at different heights, some working their way downwards and some upwards, affords a very amusing spectacle. Sometimes, when the wind is high, they are blown to the distance of several yards from the tree, and yet maintain their threads unbroken.†

* Reaumur, ii. p. 375.

† Kirby and Spence, ii. p. 294.

THE APATURINA BUTTERFI

Papilio Apaturina.

PLATE XLII.

Aconthea Apaturina, *Horsfield's Descriptive Lepidopterous Insects, in the Museum of t Company*, part ii.—*Zoological Journal*, pl. iii. fig. 1 ; 1, a.

THE upper wings are velvet black, w row of white dots along their disk, an lunar white patches next the oval marg sub-crenated; within these are three with a sub-lunar patch below; all these half covered with pale smalt blue; an blue spot near the anterior margin, and the sesquitertious margin. The lowe black, and sub-crenated, with a very extending nearly half the length of the v an eighth of an inch from the oval m articulate white band, with a macul black; close to its side, the sesquiterti are hirsute, of a pale umber colour; antennæ long. When the wings are e is about two and a half inches broad.

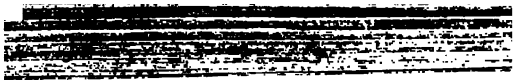
The native place of this butterfly, *Horsfield* has ascertained, is the island



42.

THE APATURIN BUTTERFLY.

Papilio Apaturina.—Java.





43.

THE SILVER STRIPE BUTTERFLY.

Papilio Paphia.—BRITAIN.

THE SILVER-STRIPE BUTTERFLY.

Papilio Paphia.

PLATE XLIII.

Papilio Paphia, *Linn. Syst. Nat.* ii. p. 786, No. 209.—*Wilk's Pap.* 57, 2, a. 7.—*Donovan's Brtish Insects.*—Argynnis Paphia, *Leach.*

THE wings are two inches and two-thirds to three inches in extent; fulvous, or bright yellow, considerably indented on their posterior margin; the upper surface is elegantly spotted with black. The under side is striped with a silvery metallic lustre.

The *Papilio Paphia* is one of the most elegant of the British Papiliones. In size, colour, and general appearance of the upper side, it is very similar to *Papilio agala;* in the under side, it is extremely different. Both these butterflies are remarkable for that peculiar shining appearance of polished silver with which a few of the European Fritillary Butterflies are ornamented; but in *Papilio agala* this silver is disposed in distinct splashes, or spots; while in *Papilio paphia* it appears in transverse streaks. These streaks are finely softened into the red and olive green of the wings, and produce altogether a singular and charming effect. It was from



lowish brown, with several longitudinal
dark brown; it is also thickly beset w
spines, a quarter of an inch in length;
particular, two of a remarkable form
annulation next the head. The chrysali
with yellow points, and it remains in th
twenty or twenty-one days, and appe
winged state early in June. It is rat
common butterfly; and chiefly inhab
Essex, Kent, Devon, Berks, and Penge



44.

THE ANDROMACHA BUTTERFLY.

Papilio Andromacha.—UNITED STATES.

THE ANDROMACHA BUTTERFLY.

Papilio Andromacha.

PLATE XLIV.

Papilio Andromacha, *Linn.*—Maniola Andromacha, *Schrank.*—Satyrus Andromacha, *Latreille.*—Hipparchia Andromacha, *Fabricius and Say.*—Oreas Marmorea Andromacha, *Hubner.*

THE wings are brown, with sub-marginal blackish spots; beneath, paler sub-perlaceous, with a series of ocellate spots; the body above and the superior surface of the wings are brown; the anterior wings beyond the middle, with a broad paler band, bifid below, and including a series of four fuscous oval spots, or epupillate ocellæ, of which the second, and sometimes the third, are small, and the posterior one largest; between the band and the exterior edge is a single narrow pale line, sometimes obsolete; exterior edge, alternately white and black; the posterior wings with a narrow, fuscous angulated line across the middle, in which is a series of fine fuscous epupillate ocellæ, with a yellow iris, the third smallest, then the fifth, and the first largest; exterior margin slightly tinged with rufous, and with one or two fuscous lines; beneath it is *perlaceous*, with a brown narrow band before the

middle, and another rather beyond the middle; beyond which is a broad lighter perlaceous band, in which, on the superior wings, are four epupillate ocellæ, the two or three anterior ones small; and on the inferior wings are six ocellate spots, consisting of a fuscous spot surrounded by a yellow line, and having a white pupil; first spot distant; third small; fifth double; exterior margin with a yellow line.

This *Papilio* frequents Arkansaw, in the United States; and it seems probable that it also inhabits the southern Atlantic States, as Hubner has given a plate of the insect. It has not been found so far north as Pennsylvania.

The caterpillar of the Andromacha Butterfly is downy and bimucronate behind; the pupa undergoes its transformations suspended by the tail; it is angulated, and bimucronated on the front.



45.

THE NICIPPE BUTTERFLY.

Papilio Nicippe.—UNITED STATES.

THE NICIPPE BUTTERFLY.

Papilio Nicippe.

PLATE XLV.

Papilio Nicippe, *Cramer*, table 210, fig. c. d.—*Herbat. Nat. Ins.* part v. p. 176, pl. 107, fig. 3, 4.—Pieris Nicippe, *Schrank and Say*, vol. ii. pl. 30.—It is the Colias and Pontia of *Fabricius*, and Gonepteryx of *Leach*.

The wings are slightly crenated, fulvous, and the terminal margin black brown; upper pair of wings with a black abbreviated line above the middle, on each pair; the inferior pair with abbreviated ferruginous lines and spots.

The black terminal margins of the upper wings extend along the costal margin, nearly to the middle; the black transverse line on this pair of wings is very short, and consists of two curvatures; this curvilinear line appears also on the inferior surface, which is yellow, very slightly tinged with fulvous on the disk, with a blackish point at each indentation of the edge, and an oval, bright, fulvous spot near the base; the black terminal margin of the inferior wings has a prominent undulation in the middle; the inferior surface of this pair of wings is yellow, marked by numerous brownish, or ferruginous, abbreviated, transverse lines; a minute black point in the centre of the wings, and two or three more obvious, irregular, undulated, ferruginous, oblique lines; head

and thorax above, blackish; antennæ beneath, with black incisures; the feet are whitish; the men is black, each side furnished with a yellow the venter with yellow incisures.

This insect is said by Cramer to inhabit Vir in the United States; but it is also found in Pen vania, and in all the southern states. It is subj some little variations; the fine fulvous spot ne base of the inferior surface of the upper wi sometimes white; and the oblique lines und inferior wings differ considerably in width an tinctness.

Schrank restricts the generic character of as follows:—"The feet are nearly equal; the of the tarsi, very apparent, bifid, or unidentate inferior wings dilated beneath the abdomen, to form a groove.

These butterflies are natives of various regi the globe; some of them are very frequent in s every field, and must have been noticed by the casual observer, flitting, in a devious direction the herbage; and, on meeting with a compa mounting aloft in the air, with a hurried and irr movement. Some species occasionally alight, in numbers, on moist places on roads.

The caterpillar is destitute of the retractile t cula of the neck; and the chrysalis is of an lated form, attached to a fixed object by a t passed around the body, the head being upwa



46.

THE RADIATED BUTTERFLY.

Papilio Ulysses.—Asia.

THE RADIATED BUTTERFLY.

Papilio Ulysses.

PLATE XLVI.

Papilio Ulysses, *Linn. Syst. Nat.* p. 748.—*Fabr. Spec. Ins.* ii. p. 13.—*Cramer, Desc. de. Papillons*, ii. pl. 121. —*Shaw's Nat. Misc.* pl. 92.

BOTH the upper and under wings of this insect are black; from the body, extending over three-fourths of the wings, it is of a fine verdigris green, radiating towards the posterior margins; the upper wings are entire, and the under wings deeply indented, with a margin of white semilunar spots, and a large caudate wing at the lower extremity of each wing. The body is black, changing into green with iridescent radiance; the lower surface of the wings has seven ocellated spots. The antennæ are short in proportion to the size of the insect, which measures five inches and a half in breadth.

This insect is of uncommon beauty. The wings are of the deepest velvet black; while the area, or middle part of each, is occupied by a very large proportion of the most brilliant and iridescent blue, which terminates in a radiated manner round the edges. This insect also affords an excellent example

of the *caudated Papilios*, in which the lower are furnished with a pair of appendages resel tails. The ground colour in some specim rather brown than black. The under sur black, tinged with rufous, large near the tip the edges of the lower pair are ornamente series of ocellated spots, of a reddish colour, with blue, and edged with black and white. an Asiatic insect.



47.

THE SMALL COPPER BUTTERFLY.

Papilio Virgaureæ.—BRITAIN.

THE SMALL COPPER BUTTERFLY.

Papilio Virgaureæ.

PLATE XLVII.

Papilio Virgaureæ, *Linn. Syst. Nat.* p. 793, No. 253.—*Donovan's Br. Ins.* pl. 172.

THE wings are angulated, the upper side of a fine brown, or red copper colour, with a black margin; under side light brown, with several white spots, some having a black spot near the centre.

A specimen of this rare insect has been taken at Cambridge. It has always had a place in the cabinets of the principal English collectors; but we cannot learn by whom it was first discovered in this country. This and the Hippothœ have been frequently confounded with each other; but, on comparison, a material difference will be discovered.

Harris has made one error, which is of importance to the English collector to correct; he says, "the *Papilio virgaureæ*, copper, feeds on grass, found in June and August in meadows; is shining copper, spotted with black." From this it appears he could mean *no other* than the common Copper Butterfly, *which is found* in June and August in meadows.

THE STATIRIAN BUTTERFLY.

Papilio Statira.

PLATE XLVIII.

Papilio Statira, *Cramer, Desc. de Papillons*, pl. 120, c. D.—Colias Statira, *Swainson's Zool. Illus.*

THE wings are diluted yellow, or fulvous; t anterior with a black border and central dot, whi beneath, is ferruginous; posterior beneath, each w two unequal snowy spots; palpi lengthened.

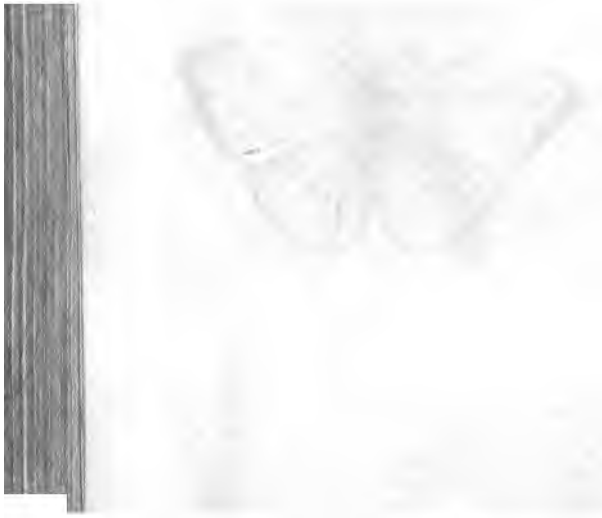
Swainson says this insect is only to be found Brasil; and thinks that Godart and Latreille h erroneously considered it as a variety of *Col juguthina,* which he considers as a native of In only.



48.

THE STATIRIAN BUTTERFLY.

Papilio Statira—Brasil.





49.

THE LICARSIS BUTTERFLY.

Papilio Licarsis.—SURINAM.

THE LICARSIS BUTTERFLY.

Papilio Licarsis.

PLATE XLIX.

Papilio Licarsis, *Cramer, Desc. de Papillons*, pl. 63, fig. c.

THIS remarkable butterfly is black; the upper wings have two sesquialterous light blue bands, continued through the under wings,—which are much elongated, with very long caudate wings; about the centre of the anterior margins of which they are deeply indented; there are two transverse light blue spots a little way above the caudate wings; and near the middle, at the inner margin, are similar spots of scarlet, and also one on each side of the anterior margins of the upper wings, close to the body; antennæ, short and erect; along the posterior margins of the caudate wings, are narrow bands of white; body, very short.

This very uncommon butterfly is a native of Surinam, and is, perhaps, one of the most curiously formed of the papilionaceous tribe.

THE HELENUS BUTTERFLY.

Papilio Helenus.

PLATE L.

Papilio Helenus, ***Linn. Syst. Nat.*** ii. p. 745, No. 4.—*Cramer, Desc. de Pap.* ii. p. 90, pl. 153, fig. A. B.

THE upper wings are black, and entire; the lower ones also black, and scalloped, with black caudate wings; round the posterior margin of the lower wings are semilunate white spots; in the centre of the wings are large spots of straw yellow, and at the lower inner margins are two semilunate spots of scarlet on each wing. The body is of a deep blackish brown.

This curious butterfly inhabits India and China, and is said to be found in the island of Amboyna.



50.

THE HELENUS BUTTERFLY.

Papilio Helenus.—INDIA.



51

THE PHLEGIA BUTTERFLY.

Papilio Phlegia.—SURINAM.

THE PHLEGIA BUTTERFLY.

Papilio Phlegia.

PLATE LI.

Papilio Phlegia, *Seba*, iv. tab. 34, fig. 7, 8,—*Cramer*, *Desc. de Pap.* iii. p. 9, pl. 197, fig. F.

THE upper and under sides of this pretty butterfly are black, as well as the body, with a wedge-shaped transverse patch of reddish orange extending from the body half across the upper wings, and a small one, the same shape and colour, on the under wings. The back has five spots of the same colour, and the segments of the body on each side are spotted with this colour; eyes scarlet, with a spot of the same colour below their outer upper surface. All the other parts of both wings are spotted with white; those on the upper wings are irregular in the centre, and forming a double row near the margins; the under wings are radiated.

The male differs from the female in having the black borders of the upper wings crossed by two narrow transverse bands of a reddish brown colour.

This interesting species is a native of Surinam, where it is said to be rather rare.

THE HELIUS BUTTERFLY.

Papilio Helius.

PLATE LII.

Papilio Helius, *Cramer, Desc. de Pap.* iii. p. 10, pl. fig. 13.

THE wings are entire, and black, as well as body; the lower ones have very large patche scarlet on each; the body is bluish black; the are scarlet; and the antennæ short and erect. under surface of the wings is black, and irides green. The abdomen is marked with yellow r beneath. It is a native of the West Indies.

This Papilio, although small, is nevertheless pretty, from the strong contrast of colour whic exhibits.



52.

THE HELIUS BUTTERFLY.

Papilio Helius.—EAST INDIES.





53.

THE ALMATHE BUTTERFLY.

Papilio Almathea.—SURINAM.

THE AMALTHEA BUTTERFLY.

Papilio Amalthea.

PLATE LIII.

› Amalthea, *Linn. Syst. Nat.* ii. p. 779, No. 174.—
mer, Desc. de Papillons, iii. p. 29, pl. 209, fig. A. B.

:E upper wings are entire, and the under ones
ted at their posterior edges, with sub-caudate
ı, curiously directed obliquely outwards at their
ɜ. The insect is black; within the whole pos-
margin there is a double row of white spots,
eight other irregularly placed white spots on
wings; a sesquialterous divided band of deep
on passes over the middle of both upper and
· wings, with several spots of the same colour
ıe upper wings. The body is dark reddish
ı, the whole of which is surrounded by a broad
of the same colour, extending from the anterior
n of the upper wings, to the lower inner angle
under ones; a transverse narrow band of the
colour runs from the body halfway along the
or margin; the eyes are scarlet; and the an-
ı short.

e general aspect of this Papilio is rather un-
on. It inhabits Surinam, and was first figured
ıdam Merian.

THE EUTREPE BUTTERFLY.

Papilio Eutrepe.

PLATE LIV.

Papilio Eutrepe, *Cramer, Desc. de Papillons*, iii. p. pl. 246, fig. D.

Both the upper and under wings and body of species are black; they have an articulate ba rich fawn colour, with which, in all the wings a number of oblong oval and lineated spots bluish-white colour, very transparent; a ro similar spots is disposed along the centre of back, one on each segment; on the upper p the body are four white and two fawn coloured s with a white one on the centre of the head.

The under surface of the wings in all res resembles the upper side, but the under part o body is white.

This Papilio is a native of Surinam.



54.

THE EUTREPE BUTTERFLY.

Papilio Eutrepe.—SURINAM.





55.

THE SYNCELLUS BUTTERFLY.

Papilio Syncellus.—SURINAM.

THE SYNCELLUS BUTTERFLY.

Papilio Syncellus.

PLATE LV.

Papilio Syncellus, *Cramer, Desc. de Papillons*, iv. p. 86, pl. 334, fig. A. B.

THE superior surface of the wings is of a rich verdigris blue, of fine satiny lustre, and thickly set with black bands; the posterior margins are black, in the middle of which is an interrupted row of high-toned fawn coloured spots; segments of the body fawn colour; back blue, the same as the wings; the eyes are of a bright scarlet, and the antennæ short and straight.

The Syncellus Butterfly is one of the rare insects of Surinam.

THE CHARLOTTE BUTTERFLY.

Papilio Charlotta.

PLATE LVI.

Papilio Charlotta, *Leach's Zool. Miscel.* p. 23, pl. 11.

THE upper surface of the wings is of a rich fawn colour, covered with various patches of dark brown; the exterior margin has a scalloped band of the same colour, with a row of longitudinal dots in its centre, and a macular fascia inside of it; body same colour as the wings; under surface of the upper wings nearly the same colour as the upper surface, fading into a sulphur yellow towards their acute angle, with a macular band of silver spots. Under wings beneath sulphur yellow, with macular bands of silver; body covered with a thick coat of subulated hairs; the antennæ rather long, with lengthened knobs on their extremities.

This curious and pretty Fritillary was discovered by the Rev. Dr Charles Abbot, in Bedfordshire, and was named by Dr Leach, who first figured it in honour of the late Princess Charlotte.

The *Papilio Charlotta* stands next to the *Papilio Aglaia* in the Linnæan system.



56.

THE CHARLOTTE BUTTERFLY.

Papilio Charlotta.—BRITAIN.





57.

THE LUDOVICA BUTTERFLY.

Papilio Ludovica.—SURINAM.

THE LUDOVICA BUTTERFLY.

Papilio Ludovica.

PLATE LVII.

Papilio Ludovica, *Cramer, Desc. de Papillons*, iv. p. 17, pl. 297, fig. E.

THE external sides of the upper wings of this insect are black, with various small patches of fine yellow; and a large band of the same colour bounds the black, within which, and extending over the body and lower wings, is a fine chestnut colour; the lower wings have a marginal band of black, with a row of white dots in the middle, which are continuous in the upper wings; the upper part of the back has four small round dots of white; the eyes are scarlet; and the antennæ long and slender. The under surface of the wings corresponds in every respect with the upper surface.

This is one of that tribe which is so remarkable for its oblong transverse shape; the body is also singularly formed, being excessively small at the commencement of the segments, and gradually bulging till about the middle one, from whence it abruptly tapers to the tail, which is short.

It is a native of Surinam.

THE BELISE BUTTERFLY.

Papilio Belise.

PLATE LVIII.

Papilio Belise, *Cramer Desc. de Papillons.* iv. p. 171, pl. 376, fig. E. F.

The upper wings are black, with an oblong spot of white towards their posterior margin, and two small spots near the lower angle of the wings. There is a large crescent-shaped white band, which occupies nearly the whole under wings; the discs terminate about the centre of the upper wings; this is surrounded with a broad edge of beautiful clear light blue, near the lower margin of which is a transverse fillet of black, and the lower posterior margin of the under wings is bounded by a white band. The body is dark brown, and the eyes scarlet.

This very pretty insect is a native of Surinam.



58.

THE BELISE BUTTERFLY.

Papilio Belisæ.—SURINAM.







59.

THE CLEONA BUTTERFLY.

Papilio Cleona.—Arbovna.

THE CLEONA BUTTERFLY.

Papilio Cleona.

PLATE LIX.

Papilio Cleona, *Cramer, Desc. de Papillons*, iv. p. 178, pl. 377, fig. F.

The wings and body of this handsome Papilio are black, with large, variously shaped spots of yellowish green, and three umber-coloured spots towards the lower edge of the under wings; the whole posterior margins of the wings are surrounded by a double row of white dots.

At the extremity of the abdomen are two tufts of hair shaped like brushes, which seem peculiar to some butterflies, but are of rather rare occurrence. The back has six white dots.

The Cleona Butterfly inhabits Amboyna, and may be ranked among the rarities of the native Butterflies of that island.

THE RICINI BUTTERFLY.

Papilio Ricine.

PLATE LX.

Papilio Helicon, *Linn. Syst. Nat.* ii. p. 756, No. 63.—Papilio Ricine, *Cramer, Desc. de Papillons*, iv. 174, pl. 378, fig. A. B.

THE upper and under wings and body of this insect are black; the upper wings entire, and the under ones slightly scalloped. In the centre of the upper wings are large oblong upright spots of rich yellow, and smaller ones of the same colour towards the extremity; the interior margin is of a beautiful crimson colour, extending over half of the lower wings; on the back there are two yellow dots behind the head, with a horseshoe-shaped mark beneath them, below which are four small dots of the same colour; the segments of the body are spotted with yellow on each side. The eyes are scarlet.

This insect inhabits America: the caterpillar feeds upon the *Ricinus palma christi*. The anterior pair of feet are short, as is the case with all those butterflies with oblong wings, which foreign naturalists distinguish by the name of nereæ.



60.

THE RICINI BUTTERFLY.

Papilio Ricine.—AMERICA.

We close our description of these sparkling, but short-lived beings of the sunbeams, with the following beautiful verses from the pen of Mrs Hemans:—

TO A BUTTERFLY NEAR A TOMB.

BY MRS HEMANS.

I stood where the lip of Song lay low,
Where the dust was heavy on Beauty's brow;
Where stillness hung on the heart of Love,
And a marble weeper kept watch above;

I stood in the silence of lonely thought,
While Song and Love in my own soul wrought;
Though each unwhisper'd, each dimm'd with fear,
Each but a banish'd spirit here.

Then didst *thou* pass me in radiance by,
Child of the Sunshine, young Butterfly!
Thou that dost bear, on thy fairy wing,
No burden of inborn suffering.

Thou wert flitting past that solemn tomb,
Over a bright world of joy and bloom;
And strangely I felt, as I saw thee shine,
The all that sever'd *thy* life and mine.

Mine, with its hidden mysterious things
Of Love and Grief, its unsounded springs,
And quick thoughts, wandering o'er earth and sky,
With voices to question Eternity!

Thine, on its reckless and glancing way,
Like an embodied breeze at play!
Child of the Sunshine, thou wing'd and free,
One moment—*one* moment—I envied thee.

Thou art not lonely, though born to roam,
Thou hast no longings that pine for home;
Thou seek'st not the haunts of the bee and bird,
To fly from the sickness of Hope deferr'd.

In thy brief being no strife of mind,
No boundless passion is deeply shrined;
But I—as I gazed on thy swift flight by,
One hour of *my* soul seem'd infinity!

Yet, ere I turn'd from that silent place,
Or ceased from watching thy joyous race,
Thou, even *thou*, on those airy wings,
Didst waft me visions of brighter things!

Thou that dost image the free soul's birth,
And its flight away o'er the mists of earth,
Oh! fitly *thou* shinest mid flowers that rise
Round the dark chamber where Genius lies.

END OF VOLUME FIRST.

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